

Coal Age

JULY 1950

NEW

Lower Cost and Higher Quality With Modern Equipment and Methods
New Machines and New Methods for the Future

Best Insurance AGAINST HAULAGE SHUT-DOWNSMINE CARS....



In order to maintain maximum coal production your transportation system must function *constantly*.

A few minutes' delay cannot materially affect daily production, but a prolonged shut-down caused by mechanical failure seriously curtails output, with resultant increase in costs per ton of coal mined.

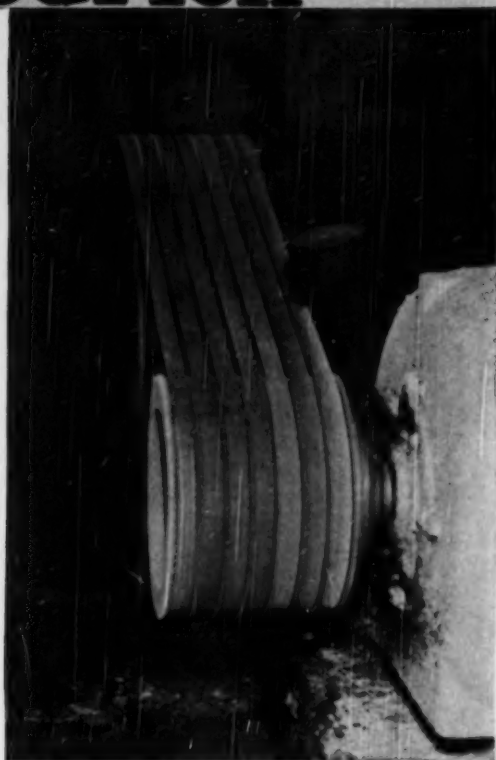
Only mine cars can give you assurance of *constant coal haulage* that's so vital to your daily production.

A.C.F. MINE CARS

Your A.C.F. Sales Representative will be glad to explain the advantages of 'constant coal haulage' with Mine Cars. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Philadelphia • Washington • Huntington, W. Va. • San Francisco • Pittsburgh • Berwick, Pa.

for Constant Haulage

B.F. Goodrich



One of these drives is wasting money — the other has grommet V belts

B.F. Goodrich grommet V belts cut costs 20 to 50%

BOTH of these drives are in the same plant, do the same work, get the same maintenance. When first installed both were equipped with ordinary belts. But within a few days the belts had stretched so much the motor had been moved to the end of the slide rails. Ordinary belts were tried again, but they still stretched, even more so. The photo at *left* shows how the belts looked — loose, permanently stretched, over-riding each other.

Then B.F. Goodrich grommet V belts were put on both drives. After six months of 24-hour-a-day service, they haven't stretched at all, as the photo at *right* shows. Here are the reasons:

Twin grommets — The B. F. Goodrich grommet is made by winding heavy

cord upon itself to form an endless loop. These grommets are placed close to the driving faces of the belt, make up the load-carrying section. No fabric plies to stiffen and build up heat. The B. F. Goodrich grommet V belt is more elastic, has less permanent stretch than any other V belt.

Grommets work all the time — In an ordinary belt much of the cord strength is lost, wasted in the center of the belt where the cords don't pull their share of the load. But in the grommet belt there are no center cords to loaf. The grommets do the work, stay at it all the time.

Grommets last longer — Laboratory and field tests show grommet V belts last 20 to 50% longer. Cause

of most belt failures is eliminated by the grommets that replace overlapping cord plies.

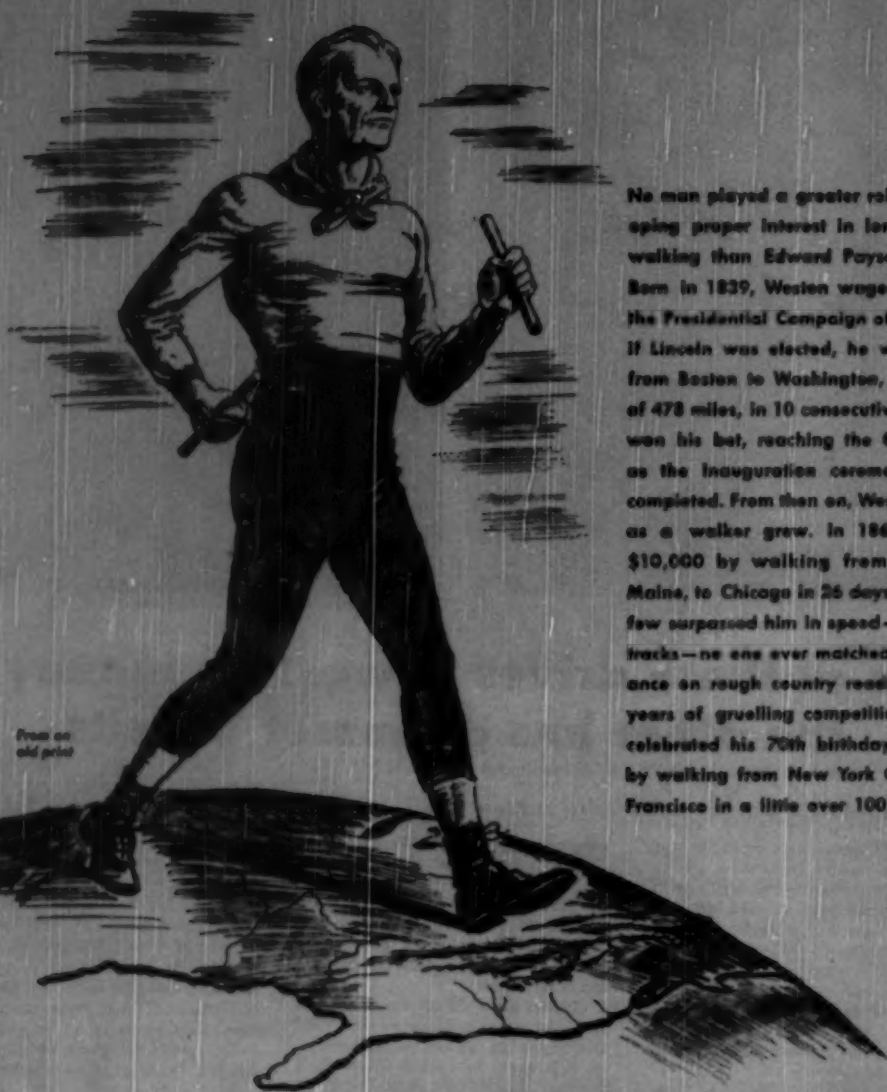
The twin grommet construction is a result of B. F. Goodrich research (U. S. Patent No. 2,233,294). No other V belt is a grommet V belt. Presently made in D and E sections only.

A special demonstrator "X-ray" belt has been made to show the grommet construction. Ask your local BFG distributor to bring it around. The B. F. Goodrich Company, Industrial and General Products Division, Akron, O.

Grommet V Belts **BY**
B.F. Goodrich

The Champion

...IN LONG DISTANCE WALKING



No man played a greater role in developing proper interest in long distance walking than Edward Payson Weston. Born in 1839, Weston wagered, during the Presidential Campaign of 1860, that if Lincoln was elected, he would walk from Boston to Washington, a distance of 478 miles, in 10 consecutive days. He won his bet, reaching the Capitol just as the Inauguration ceremonies were completed. From then on, Weston's fame as a walker grew. In 1867 he won \$10,000 by walking from Portland, Maine, to Chicago in 26 days. Though a few surpassed him in speed—an indoor track—he was never matched his endurance on rough country roads. After 40 years of gruelling competition, Weston celebrated his 70th birthday, in 1909, by walking from New York City to San Francisco in a little over 100 days.

MULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION



Hulburt Quality
"The Champion" **GREASE**

No lubricant has played a greater role in developing proper coal mine lubrication than Hulburt Quality Grease. You needn't "bet" on results — for Hulburt always "wins in a walk" when a Hulburt Lubrication Engineer goes down into your mine and shows you how best to use it. No mining machine matches in endurance a mining machine lubricated the right way with the one right Grease—Hulburt. Every birthday we celebrate sees more and more coal mining machinery running—not "walking"—on Hulburt Quality Grease.



Already, This Many
BIRD COAL FILTERS
*Out On The Job,
 Drying Fine Coal*

They must be good!

They must do the job the best,
 most economical way.

They must stand up—running day in
 and day out for months at a lick,
 without shutdowns for maintenance
 or overhaul.

YOU NEED 'EM TOO!

Get the facts. Write

BIRD MACHINE COMPANY
 South Walpole, Massachusetts



The BIRD

**Continuous Centrifugal
 COAL FILTER**



THIS MONTH'S COVER

HIGHLIGHTS the theme of this special *Coal Age* issue—the effective use of men, methods and equipment to achieve low cost, high quality and maximum safety. We suggest you start your study of this issue with the Foreword appearing on p. 69.

COMING IN AUGUST

● **Coal's Brighter Side**—Why the mourners' bench critics are wrong about coal's future. Look for this—coal is better off than you think.

● **Ultra-Modern Coal Cleaning** at the new Truax-Traer central plant, Ceredo, W. Va. Special river-loading facilities supplements the latest in washing, screening, crushing and drying.

● **Engine-Generator-Battery Power** for shuttle cars—How it works and what it offers you in operating advantages.

● **Piggyback-Conveyor Transportation** behind loaders at Crichton No. 4 mine. In 4½-ft. coal, this unit has raised average tons per man at the face from 10 to 22.

● **Two-Seam Stripping** in Western Kentucky attains quality and efficiency in mining and preparation for Colonial Coal Mining, Inc.

● **How the Airplane promotes mining development, operation and maintenance** for the Yoxtheimer organization of Pennsylvania.

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CAMERA TELLS WHY... **BEARINGS LAST**

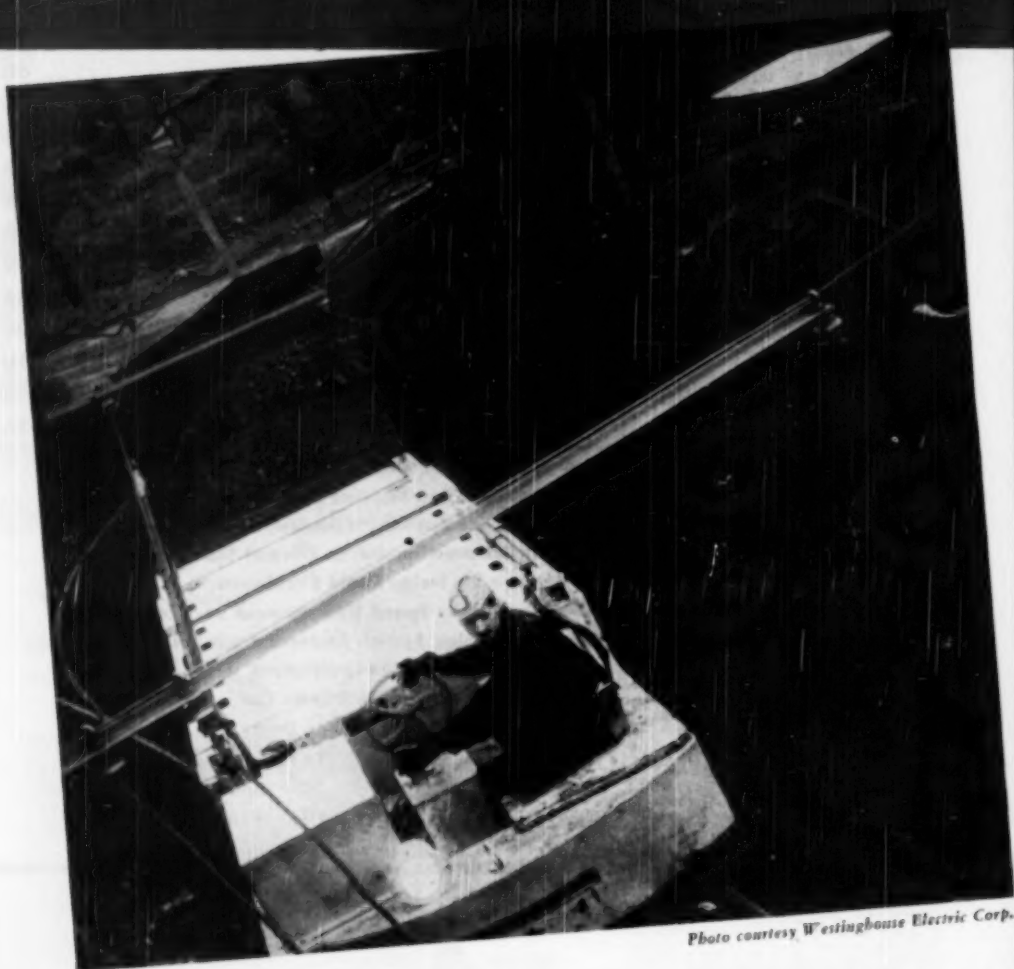


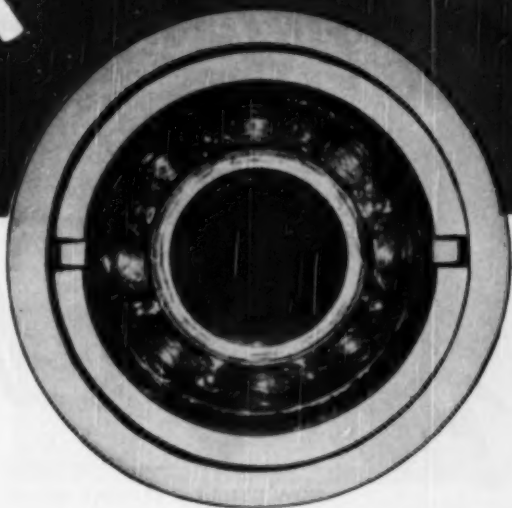
Photo courtesy Westinghouse Electric Corp.



TEXACO LUBRICANTS

LONGER

Anti-friction bearing stopped in motion by stroboscopic light. When this picture was taken, bearing was revolving at 3750 r.p.m., and the grease temperature was above 250° F. Note how *Texaco Regal Starfak* completely floods the retainer and moving parts. You can get this same full protection for all your anti-friction bearings by using *Texaco Regal Starfak*.



When you use **TEXACO REGAL STARFAK**

Grease-lubricated ball and roller bearings in locomotives, cutters, loaders, motors and other equipment last longer, and cost a lot less for maintenance when lubricated with *Texaco Regal Starfak*. This premium-quality lubricant stays in the bearings and gives full protection — as the picture demonstrates.

Texaco Regal Starfak is especially designed to resist oxidation, gum formation, separation and leakage. It is not affected by seasonal temperature changes, and assures freedom from "drag" in starting and running. In addition, *Texaco Regal Starfak* lasts longer than ordinary greases so that fewer

applications are necessary.

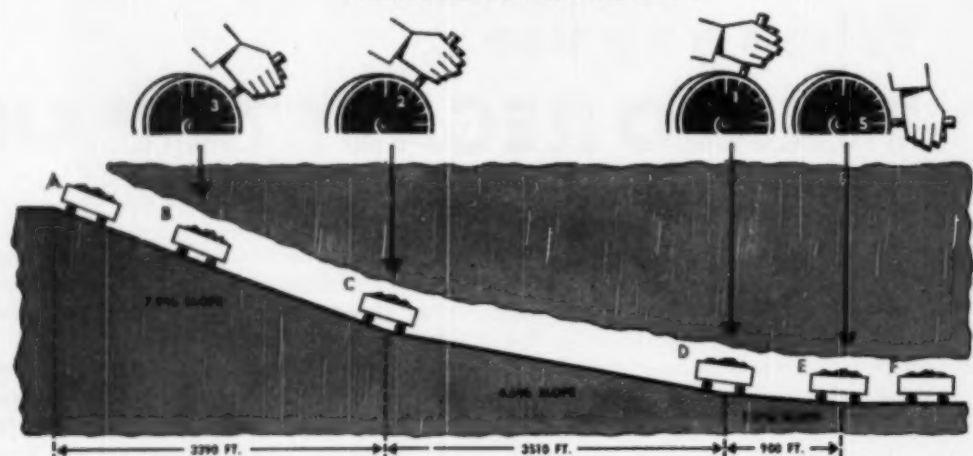
In low-speed, heavy-duty anti-friction bearings, use *Texaco Marfak*. It will give full protection for longer-than-ordinary periods . . . prolong bearing life . . . reduce maintenance costs.

Texaco has cost-saving lubricants for *all* your mine machinery. A Texaco Lubrication Engineer will gladly help you select the proper ones. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 states, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

Cut brake wear! Save spotting time! Promote safe lowering!

HOW DYNAMIC BRAKING HOLDS THIS UNBALANCED SLOPE HOIST TO APPROXIMATELY 40% FULL SPEED



A At start, car is lowered by gravity and allowed to accelerate to 40% full speed.

B Dynamic braking is then applied in order to prevent speed increase.

C Because of slope change, only approximately 25% braking torque is required to hold speed.

D Electric braking is further decreased to about 13% to correspond with reduced pitch of track.

E At bottom, 100% braking torque is applied to decelerate to low speed for spotting.

F Mechanical brakes are applied only at end of trip to spot and hold cars.

To provide allowable man-trip speed while lowering, 40% of the full rated speed of 1200 fpm is desired over the 7800-foot length of travel. Using dynamic braking to obtain this

desired speed, the operator watches his electric rope-speed indicator and simply moves his master switch to the points of braking required. Thus the speed is held in good control.

GENERAL  ELECTRIC

663-6

General Electric a-c mine-hoist drive in this unbalanced-slope installation uses d-c dynamic braking control to give these advantages in reduced-speed lowering

To increase hauling capacity, the operators of a West-Central Pennsylvania mine recently installed a co-ordinated General Electric a-c mine-hoist drive. Replacing a smaller one, the new drive has boosted payload capacity to 95 tons per trip—330 tons per hour!

But that's not all! Use of d-c dynamic braking to control the hoist motor during reduced-speed lowering also provides these advantages:

Safety promoted! Lowering man-and-material trips are made at safe, uniform speeds, without jerking.

Maintenance costs cut! Mechanical brakes are used only to hold trip at its destination and for final stopping after retarding to low speed with dynamic braking—thus lessening strain and wear on brake wheels and linings.

Spotting time reduced! Control of low-speed lowering permits spotting, landing, and dropping trips into partings with minimum delay.

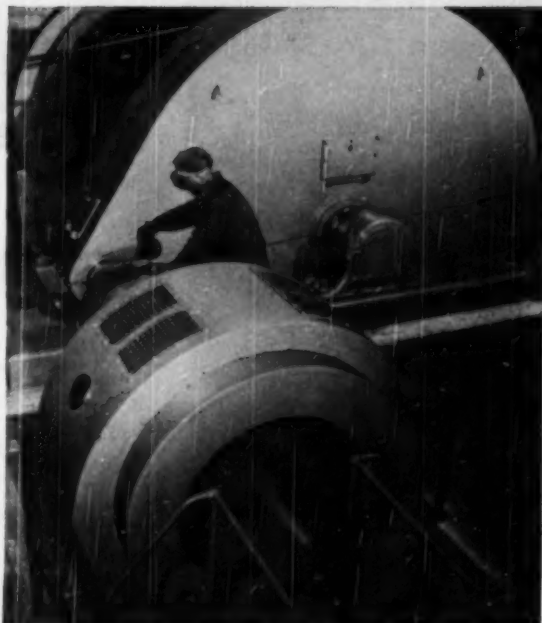
Economy! Simplicity! Reliability!

G-E induction-motor mine-hoist drives combine the advantages of low first cost and upkeep, simple installation and operation, high efficiency, and rugged reliability. That's why over 800 are now in service, helping to step up mine production and cut hoisting costs.

For experienced help on mine-hoist drives and other electric equipment to cut mining costs, it will pay you to call in a G-E mining specialist. Phone him at your nearest G-E office. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



Mine-Hoist Drives
...to cut mining costs!



Typical of hundreds of others is the G-E 800-hp wound-rotor induction motor geared to the hoist at this mine. In ratings from 50 to 3500 hp, these motors offer the simplest way to obtain the advantages of electric drive for mine hoists.



G-E control and protective equipment, located in the hoist house conveniently near motor and drum, provides full magnetic reversing d-c dynamic braking control of the hoist motor and protection of machines and power system.

Allis-
Chalmers

Design

Another big reason why

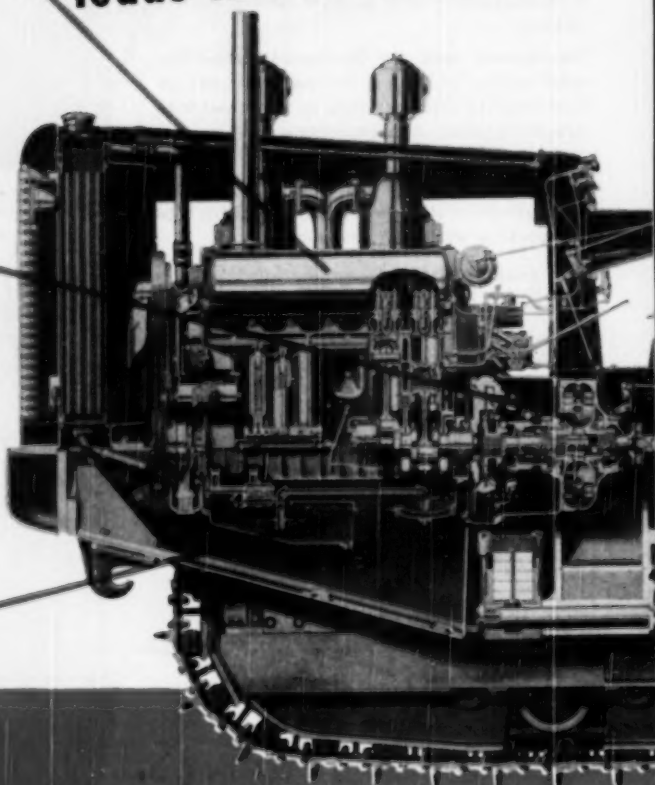
HD-19

leads in tractor output

Clutch can be removed without dismantling clutch.

Torque converter can be removed without dismantling engine or transmission.

Clutch assembly can be removed without dismantling either engine or transmission.



More Reasons for HD-19 Top Performance

Torque Converter Drive

48,000 lb. of Balanced Weight

Exclusive Positive Seal 1000-Hour Lubrication

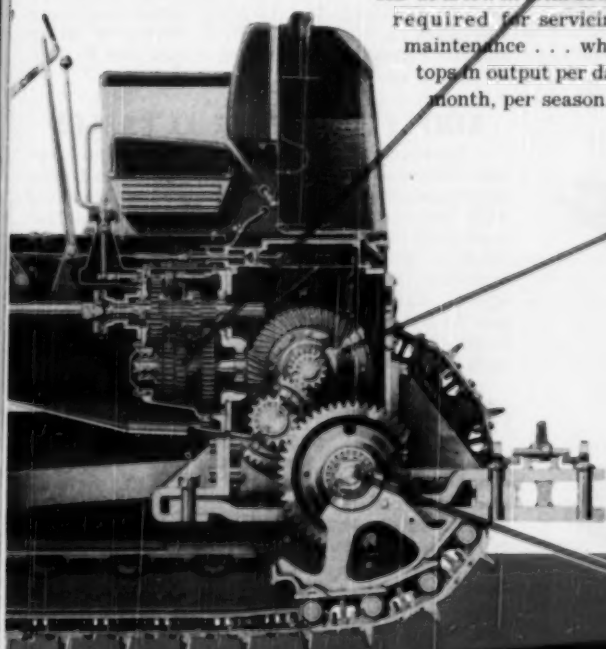
Greater Operator Comfort

Simplicity

Gears, pinions and bearings by the dozen have been eliminated in the HD-19. This means fewer parts to wear — fewer breakdowns and fewer repair bills.

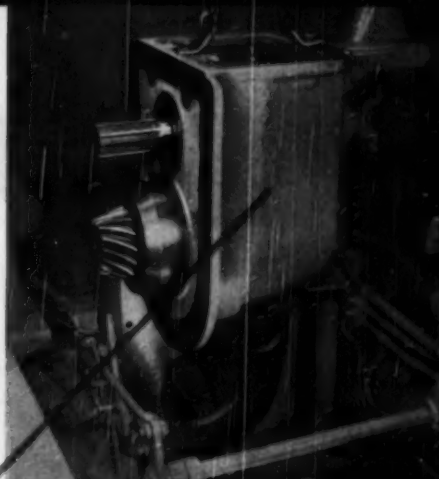
When maintenance is necessary, each assembly is readily accessible for attention. The HD-19 is designed so that each major unit may be easily removed and repaired or replaced *right on the job* without removing unrelated parts. The time and labor saved means substantial increases in the HD-19's over-all output. Remember, a tractor makes money for an owner only when it's working.

Simple unit assembly is another important reason why the HD-19 is low in total down time required for servicing and maintenance . . . why it is tops in output per day, per month, per season.



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

For Greater Production
For Easier Operation . . . For Simplified Servicing



Transmission can be removed as a complete unit without removing clutch, final drive or hand gear.



Each steering shaft can be removed independently and without disturbing final drive or hand gear.



Final drive gear and intermediate gear can be removed without disturbing steering shaft.

LOOK to

for OUTSTANDING NEW ADVANCES
IN MINE CABLE DESIGN...

For Instance: During only the past year the Simplex Research Team developed and perfected the following three cables designed to increase the efficiency of shuttle car service, of high-voltage power systems, and of signal, control, and communications circuits:

SIMPLEX-TIREX TWIN SHUTTLE CAR CABLES

Feature Gear-Shaped insulated conductors that firmly interlock with the jacket so that even continual twisting of the cable will seldom pull them out of position. They will not twist or override each other. The Selenium Neoprene Armor is CURED-IN-LEAD for extra toughness and bears approval of the U. S. Bureau of Mines and the Pennsylvania Dept. of Mines (No. P-101). Available as Type W and Type G.

SIMPLEX-ANHYDREX XX CABLES

High-voltage cables that assure uninterrupted service at 2,000-17,000 volts operation in underground, duct, or aerial installations. Insulated with Anhydrex XX, first high-voltage insulation combining all the properties necessary for trouble-free operation when exposed to water and moisture, heat, ozone, and other deteriorating agents. Jacketed with a special neoprene compound that provides steadfast protection against rough handling, soil acids and alkalis, oils, grease, chemicals and flame.

SIMPLEX POLYETHYLENE-PLASTEX CABLES

Lightweight, small-diameter cables for signal, control, and communication circuits. Polyethylene insulation features thin wall, high dielectric strength, high insulation resistance and low water absorption. Its low power factor and low dielectric constant assure maximum signal strength. Plastex jacket is resistant to oxidation, flame, oil, water, sunlight and weathering. It is usable over a temperature range of about 200 degrees Fahrenheit and it resists cracking down to -58°F. Available in three types adapted to underground, duct, conduit, and aerial installation.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

SIMPLEX

plus A COMPLETE LINE OF PERFORMANCE-PROVED
CABLES FOR EVERY MINE USE...

SERVICE	USE	SIMPLEX PRODUCT
MINING	Electric Drills Shot Firing	TIREX SO Cord. TIREX Heavy Duty Mine Cord. TIREX Shot Fire Cord (Round). Simplex Shot Fire Cord (Twin).
	Shuttle Cars Shuttle Cars, Cutters, Loaders, Continuous Miners } Locomotives Stripping Shovels and Draglines }	TIREX Special Shuttle Car Cable (see opposite page). TIREX Twin Mining Cable; Type W, without ground wires; Type G, with ground wires. Also TIREX 3-Conductor Round Cable, Type W. TIREX Locomotive Cable; steel reinforcing strands in conductor. TIREX High-Voltage Cables; Types W, G, SH-A, SH-B, SH-C, SH-D. All TIREX Cords and Cables are jacketed with CURED-IN-LEAD Selenium Neoprene Armor. All stock sizes for mine use have approval, No. P-101, of the Dept. of Mines, Comm. of Pennsylvania.
MINE EQUIPMENT	Air Compressors (Portable) Air Compressors (Stationary) Ventilating Fans Mine Pumps Car Pullers }	TIREX Twin Cables, Types W and G. TIREX 3-Cond. Round Cable, Type W. Anhydrex or Anhydrexene Cables. Both feature the exceptional moisture resistance of Anhydrex insula- tion and the durability of a neoprene jacket. Anhy- drex cables can be installed directly in earth, in conduit, and in air. Anhydrexene cables, with lighter jacket, should not be buried directly in earth.
	Track Signal Systems Telephone Systems	Anhydrex Multi-Cond. Signal Cable. Polyethylene- Plastex Signal Cable (see opposite page). Anhydrex Mine Telephone Cable.
COAL PROCESSING EQUIPMENT	Washhouse Wiring Crashers Vibrator Screens	Anhydrexene Wires. Anhydrex Cables. Anhydrexene Cables. TIREX SO Cords. Anhydrex Cables.
SHOPS	Machine Tools	TIREX SO and SJO (light service) Cords. Plastex Machine Tool Wire; available with light, heavy and extra-heavy insulation.
	Welding Machines Electrode Cable Electrode Return Welding Machines Power Side Locomotive Wiring Battery Charging	TIREX Super-Flexible Welding Cable. TIREX Single Conductor Cable. TIREX 2 and 3-Conductor Cables. TIREX Motor Lead Cable. TIREX Twin and TIREX Round Type W Cables.
POWER AND LIGHTING	Aerial Distribution Systems Underground Distribution Systems	Anhydrex, Varnished Cambric, and Paper Insulated Cables—available with built-in messenger or mes- senger can be applied in field by Spinner. Anhydrex Cables; provide resistance to water and moisture, soil acids and alkalis, have no metallic sheaths to crystallize and corrode.
	Boreholes and Shafts Sub-Surface Distribution Switchboard Wiring Yard Floodlighting	Anhydrex Cables and Varnished Cambric Cables— available with a wide choice of outer coverings to meet the requirements of all methods of suspension. Anhydrex Feeder Cables, Varnished Cambric Feeder Cables. Anhydrexene Wires, Plastex Wires. Anhydrex Cables.

Write for Catalog 1008, "Simplex Cables for Mining"

THE THOMAS LAUGHLIN COMPANY

PORTLAND 6, MAINE, U. S. A.

Established 1866

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Fort Worth 4, Tex.

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4000 York St., Denver 5, Colo.

425 South Western Ave., Los Angeles 13, Cal.

250 Perry St., San Francisco 7, Cal.

233 Ninth Ave., N. Seattle 9, Wash.

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



The illustrated items are typical of the Laughlin line of close to 1000 types and sizes of drop-forged fittings, as listed with prices in new CATALOG NO. 145. Free copy on request.

WE SELL ONLY THROUGH QUALIFIED SUPPLY HOUSES



LAUGHLIN "FIST-GRIP"

Wire Rope

SAFETY CLIPS (Patented)

Drop-Forged Steel . . . Hot Galvanized. For 15 wire rope diameters from $\frac{3}{16}$ " to $1\frac{1}{2}$ ".

ADVANTAGES:

1. Foolproof . . . identical saddles prevent upside-down installation.
2. Saves time and tools . . . easy to put on with any kind of wrench.
3. Stronger . . . bolts are integral with saddles.
4. Protects rope . . . large gripping surface doesn't crush wire.
5. Fewer clips required . . . greater holding power with less weight.
6. Safer . . . deliver higher rope efficiency than any other clips.
7. Cost less per installation in most popular sizes.
8. Longer life . . . no long bolt ends to get battered and bent.

LAUGHLIN ORIGINAL "MISSING LINK"

Reg. U. S. Pat. Off.

Drop-Forged Steel — Heat Treated. 17 sizes from $\frac{3}{16}$ " to $1\frac{7}{8}$ ".



ADVANTAGES:

1. Quick and easy to attach . . . insert each pressure-matched half through links to be joined andpeen the rivets to fill the countersunk holes.
2. Cheaper than welding.
3. Safer than a cold shut or cast link . . . interlocking lugs take all the load.
4. Stronger than proof coil chain.



LAUGHLIN SAFETY HOOKS

Drop-Forged Steel

The Latch Locks the Load.

15 sizes for safe working loads from 1,200 to 30,000 lbs. in 3 patterns: eye, shank and swivel.

ADVANTAGES:

1. New, improved safety latch leaves 80% of the regular throat opening.
2. Strong . . . sturdy pressed steel or cast bronze latches attached by stainless steel rivet to cam which is integral with hook forging.
3. Safe . . . latch will not open until released by operator's fingers.

LAUGHLIN CLEVIS GRAB HOOKS

Drop-Forged Steel — Heat Treated

6 sizes for chains from $\frac{1}{4}$ " to $\frac{3}{8}$ ".

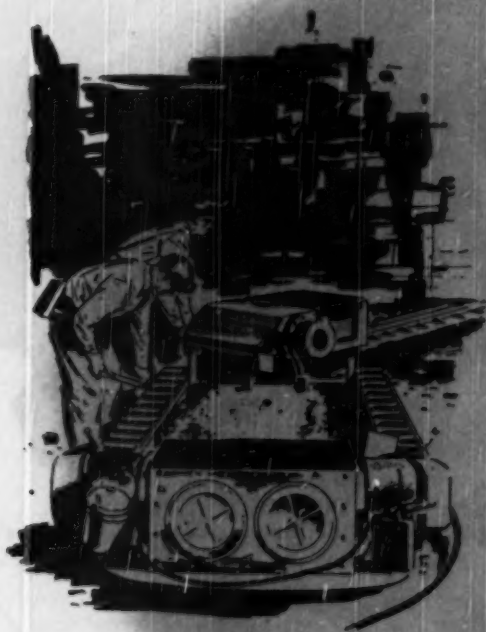
ADVANTAGES:

1. Saves time . . . easily attached to any welded link chain . . . no connecting fitting needed . . . easily removed without cutting link.
2. Economical . . . costs little more than eye grab hook.
3. Stronger than ordinary grab hooks.
4. Safe . . . forged housing protects pin from end thrust . . . prevents cotter from injuring worker's hands.



For really economical mining machine cables . . .

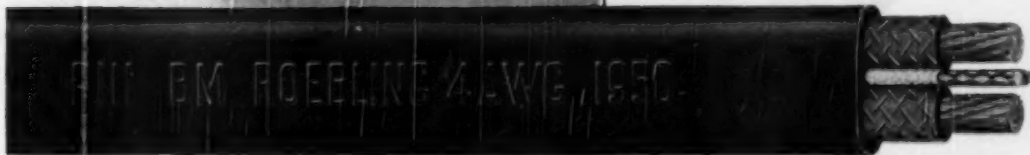
Today it's Roebling!



YOU'LL SAVE MONEY in the long run with Roebling ROEPRENE Mining Machine Cables. They stay on the job longer because their jackets are "lead-mold" cured by a special process. This makes them a lot more tough, dense and resilient than ordinary jackets . . . far more resistant to cuts, impact, abrasion, water and grease.

Roebling ROEPRENE Mining Machine Cables are furnished in two-conductor concentric; two-conductor parallel twin; and two or more conductors in round construction, the two latter available without ground wires (Type W) or with ground wires (Type G). Conductors are insulated with a moisture- and heat-resistant compound. The ROEPRENE sheath is permanently bonded to the insulation by open reinforcing cords. All are approved by the Pennsylvania Bureau of Mines, Approval P-111, and comply with the requirements of the U.S. Bureau of Mines for flame-resistant mining cables.

There's an economical Roebling Portable Power Cable for every type and make of portable equipment. Your Roebling Distributor will always be glad to help you choose the right cable for top efficiency and working life. John A. Roebling's Sons Company, Trenton 2, New Jersey.



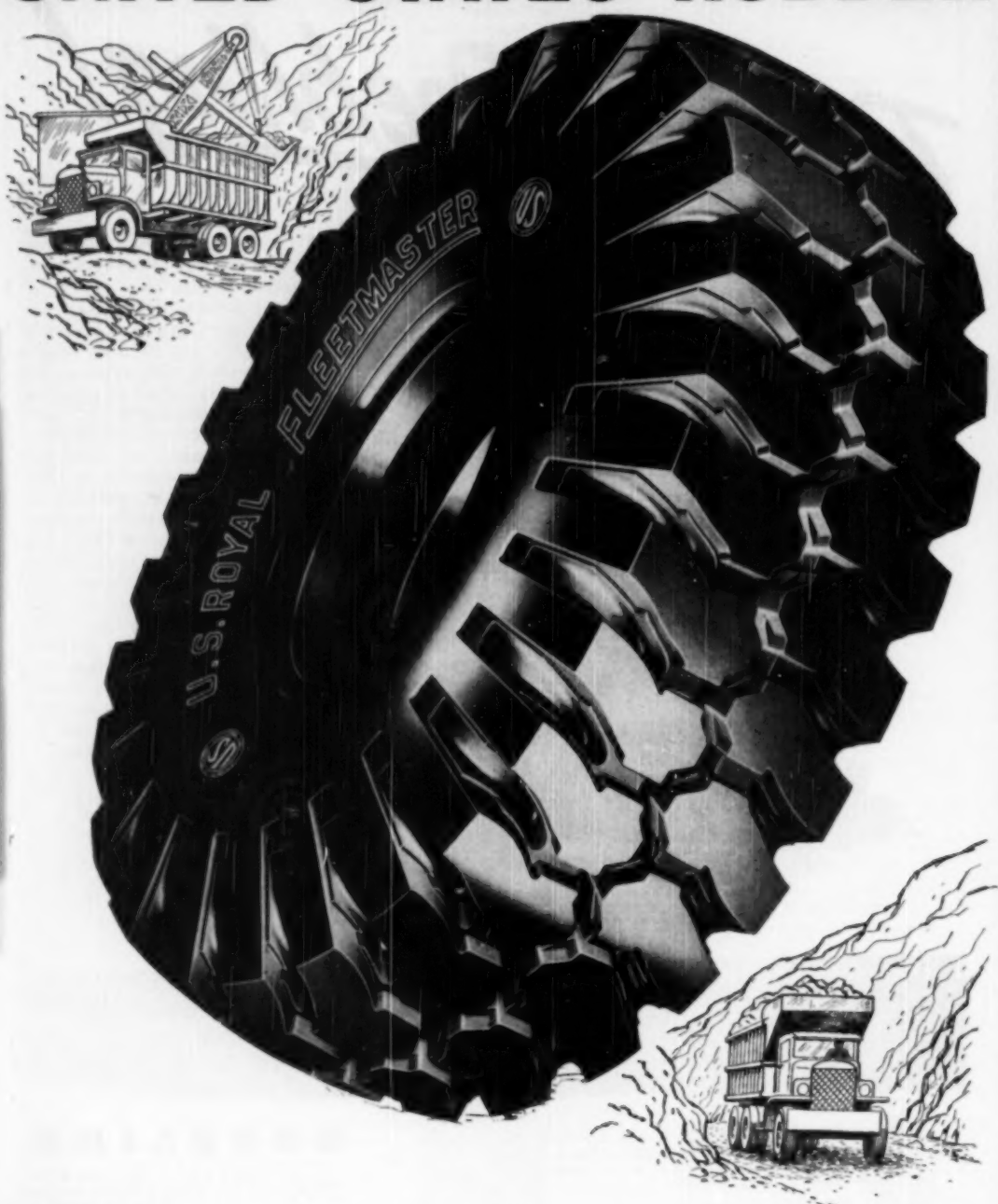
From copper rod to finished cable, all components of Roebling electrical wires and cables are manufactured in Roebling's own plants. Painsstaking care, engineering and modern precision machines assure products of the highest quality.

ROEBLING

A CENTURY OF CONFIDENCE
Atlanta, 934 Arden Ave. • Boston, 51 Slooper St. • Chicago, 5325 W. Roosevelt Road • Cincinnati, 3253 Fredonia Ave.
• Cleveland, 701 St. Clair Ave., N. E. • Denver, 6801 Jackson St. • Houston, 6216 Navigation Blvd. • Los Angeles, 216 S. Alameda St. • New York, 19 Rector St.
• Philadelphia, 12 S. Twelfth St. • Portland, 1032 N. W. 14th Ave. • San Francisco, 1708 Seventeenth St. • Seattle, 900 First Avenue S.



UNITED STATES RUBBER



Off the road—on the road—the only

COMPANY Presents

THE GREAT ^{NEW} *Mid-Century* U. S. ROYAL

FLEETMASTER

for the first time ever—built from the ground up!

your Super-Utility tire

Off the road—on the road—in all seasons—on all surfaces—complete master of every mining condition

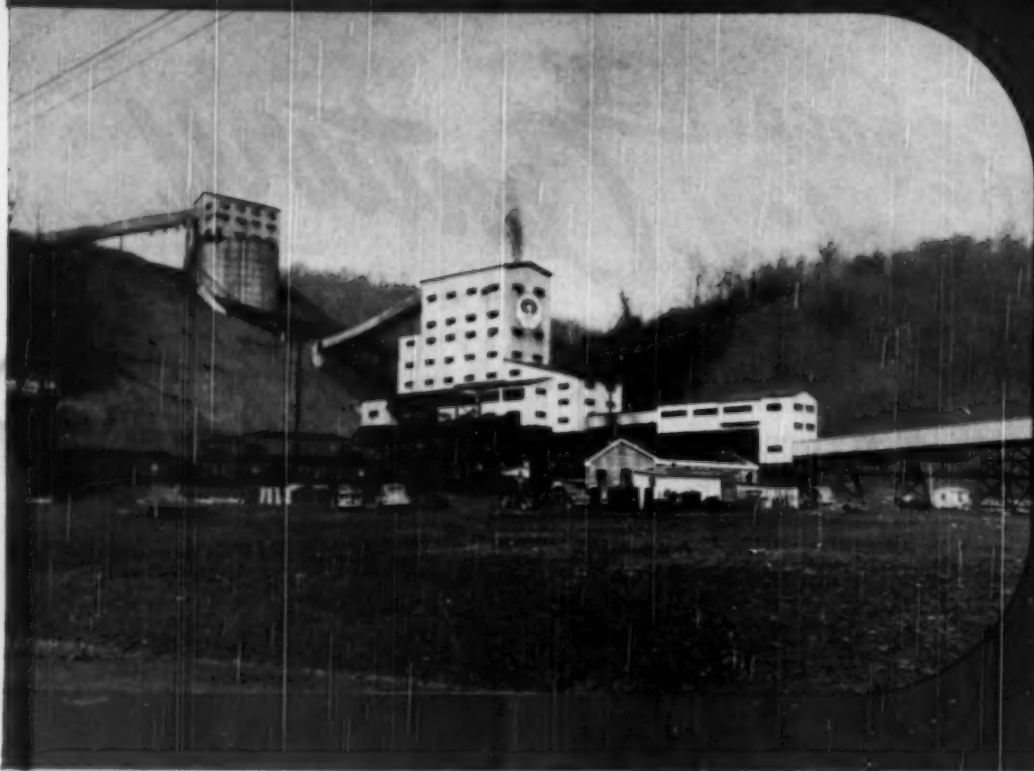
In the most rugged strip-mining operation—over jagged roadbeds, up steep, rock-strewn slopes, across roads covered with snow and ice—this new Mid-Century tire has done it at last. The U. S. Royal Fleetmaster has beaten that off-the-road, on-the-road mining combination that no tire has ever beaten before! This is your tire . . . built for you from the ground up—tested and proved for you on the job from coast to coast—the only super-utility tire in the world!

- For the first time—a complete sub-tread, bracing and locking every lug, with firm, full-chain lug action . . . with master traction in all ground, under all loads.
- For the first time ever—a super-utility tire that delivers mileage far beyond that previously delivered by other tires in this type of service.
- For the first time ever—a super-tough deep-treaded tire . . . master of cut, crack and chip.
- For the first time ever—rupture and bruise resistance that can stand up to the toughest service and come back for full, safe recapping.
- For the first time ever—super-tread depth and width with instant ejection of rock or stone.
- For the first time ever—a load-molded tire . . . built round . . . mounts round . . . fits modern rims, reduces stress and strain on the tire body.

Mid-Century Fleetmasters are available now. Your U. S. Royal Distributor is ready to mount them on your trucks. Call him today.

super-utility tire in the world





This modern Chance Coal plant at the Christopher Coal Company's Arkwright mine cleans and ships over 10,000 tons of coal per day with an operating staff of only 15 men per shift.

**OUR EXPERIENCE
ASSURES YOU OF
ECONOMY AND
COMPLETE SATISFACTION**

FAIRMONT MACHINERY

Designers and Constructors of Chance Sand Flotation Process



INDUSTRIAL PLANTS

used

118,723,000

TONS

*of Bituminous Coal
in 1948*



CHANCE ORIGINAL "HEAVY DENSITY" COAL CAPABLE

YOU CAN GET YOUR SHARE OF THIS MARKET

with

FAIRMONT

cleaned coal

This vast tonnage used by Industrial Plants is in addition to the coal consumed by other industries such as Cement Mills, Steel and Rolling Mills, Electric Utilities, Coke, Gas and Chemical plants.

Here is an attractive market for those operators who can deliver coal properly prepared to meet the quality specifications required.

The Chance Sand Flotation System operates over a wide range of gravities. Thus this Fairmont equipment gives the operator a cleaning process with an exceptionally wide latitude in controlling the quality of his product to meet varying market conditions where wet cleaning is desirable.

In addition Fairmont offers the American Pneumatic Separator for operations where dry cleaning is best suited.

Fairmont Engineers are available to help you select the cleaning process best suited to your operating conditions and to provide you with the highest possible quality coal. Consult them on your cleaning needs.

COMPANY • FAIRMONT, W. VA.

for Wet Cleaning and American Pneumatic Separator for Dry Cleaning

Lee:

Monday A.M.

Re machine and carriage
bolts, I placed the order with
Bethlehem. They carry our
sizes in stock. Delivery
promised day after tomorrow.

Jack



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

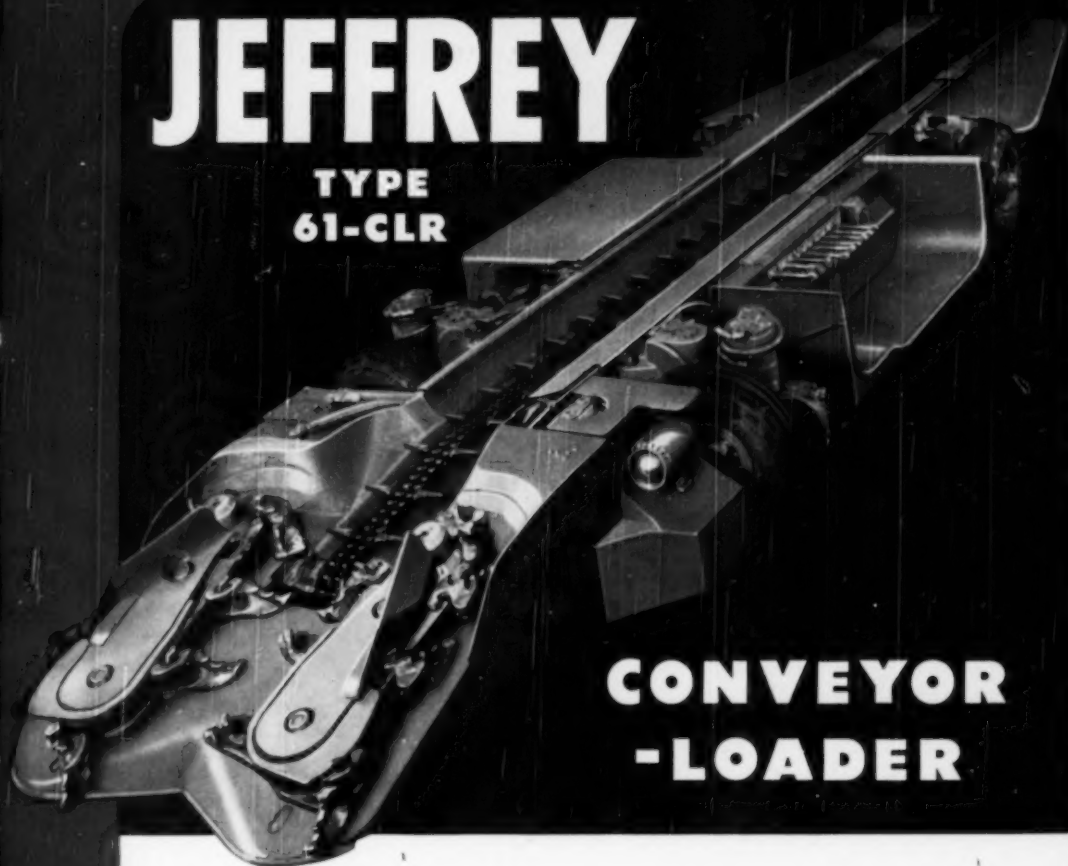
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor; Bethlehem Steel Export Corporation

• Other Bethlehem Fastenings for the Mine •

RIVETS • U-BOLTS • TRACK BOLTS • SPIKES • THREADED RODS • ROOF BOLTS AND ACCESSORIES

JEFFREY

**TYPE
61-CLR**



**CONVEYOR
-LOADER**

A Unique Type of Loader for Conveyor Mining

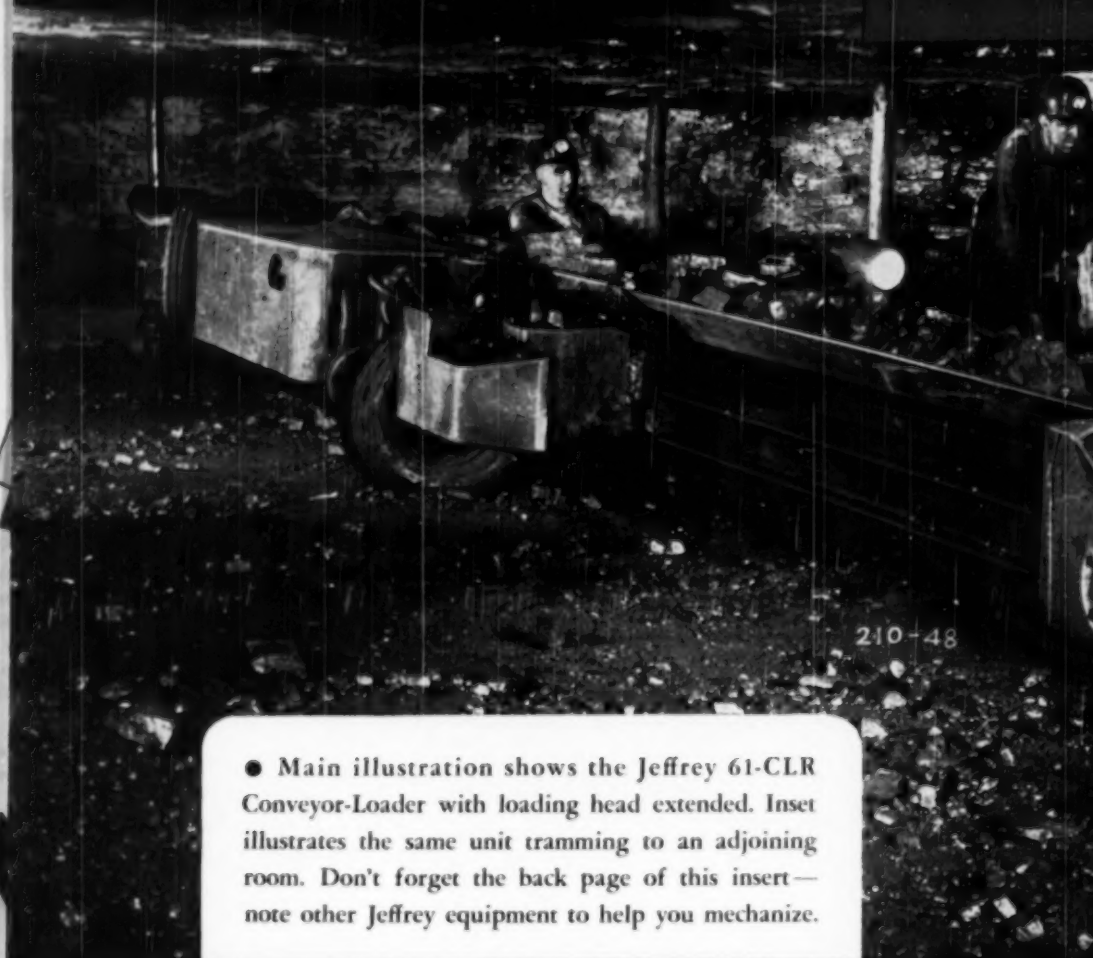
This loader demonstrates a unique principle which permits loading out all coal from the cut with the discharge point pivotally anchored above the room conveyor onto which it discharges. The fixed discharge point eliminates shuttling back and forth of entire machine between shot down coal and conveyor, thus eliminating spillage along the pan line.

Easier and safer to operate as operator can concentrate on loading and forget about the discharge end. The extensible gathering head with its twelve-foot travel will reach all areas along the face of a thirty-five foot room.

Hydraulic controls conveniently located, high loading capacity (1 to 1½ tons a minute in loose coal), low overall height of 24 inches and its maneuverability make the Jeffrey 61-CLR machine ideal for low coal operation and extremely economical in seams up to 48 inches high.

Consult a Jeffrey engineer on more economical equipment for your operation.





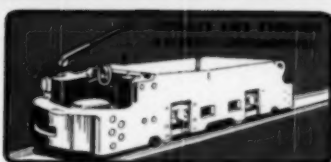
210-48

● Main illustration shows the Jeffrey 61-CLR Conveyor-Loader with loading head extended. Inset illustrates the same unit trampling to an adjoining room. Don't forget the back page of this insert—note other Jeffrey equipment to help you mechanize.

WHEREVER COAL IS MINED YOU



YOU'LL FIND JEFFREY EQUIPMENT



JEFFREY

EQUIPMENT

FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

Established 1877

General and Export Sales Offices
COLUMBUS 16, OHIO, U. S. A.

DISTRICT SALES OFFICES

BALTIMORE 2, MD. Munsey Bldg.
BIRMINGHAM 3, 2210 Third Ave. N.
BOSTON 18, 38 Newbury Street
BUFFALO 2, Jackson Building
CHICAGO 1, Bell Building
CINCINNATI 2, Carew Tower
CLEVELAND 13, Rockefeller Building

DENVER 2, Ernest & Crammer Bldg.
DETROIT 13, 5808 St. Jean Avenue
HARLAN, Kentucky
HOUSTON 2, TEXAS, City National Bank Bldg.
HUNTINGTON 19, W. VA., Guaranty Bank Bldg.
JACKSONVILLE 2, Barnett Bank Building
MILWAUKEE 2, 735 N. Water Street

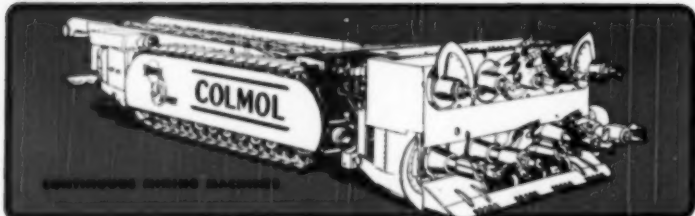
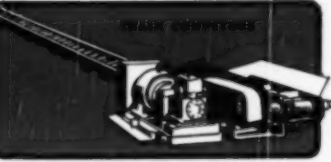
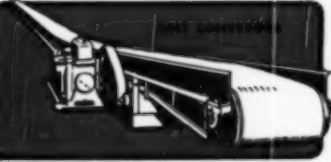
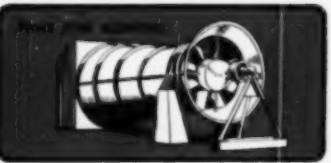
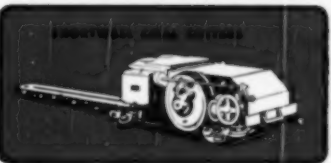
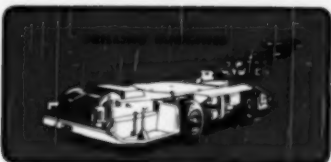
NEW YORK 7, 30 Church Street
PHILADELPHIA 3, Broad St. Station Bldg.
PITTSBURGH 22, Oliver Building
SALT LAKE CITY 1, 161 W. 2nd South St.
ST. LOUIS 1, Railway Exchange Bldg.
SCRANTON 3, 122 Adams Avenue

SERVICE STATIONS

BIRMINGHAM • PITTSBURGH • JOHNSTOWN • SCRANTON • MT. VERNON, ILL. • HARLAN KY
In West Virginia: BECKLEY — CABIN CREEK — LOGAN — MORGANTOWN — WELCH

FOREIGN PLANTS

JEFFREY MANUFACTURING CO. LTD., Montreal, Quebec
BRITISH JEFFREY DIAMOND LTD., Wakefield, England
JEFFREY GALION (PTY.) LTD., Johannesburg



**READ WHAT
USERS SAY
ABOUT**

G.E.'s New All-Purpose* Insulating Varnish **G-E 9574**

J. L. Hughes, owner of the J. L. Hughes Electric Company, Columbus, Ohio, says:

"We have found from test and practical experience that General Electric general-purpose varnish 9574 is tops for our work."



J. Lindborg, owner of AAA Electric Motor Service, Atlanta, Ga., says:

"Our experience has been that this varnish is as good as G.E. claims. It gives a good coat on every type of wire, bakes easily and dries to a tough coating that stands up perfectly in service."

These statements indicate the success of the new G-E 9574. If you are looking for an insulating varnish which bakes at low temperatures, penetrates deep coils easily, and requires no special thinner, investigate G-E 9574.

*G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G.E.'s complete line of electrical insulating materials, including wedges, adhesives, cements, compounds, cords and tapes, slaving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, and varnishes.

Guy W. Probst, owner of Lockhaven Electric Repair Co., Lockhaven, Pa., says:

"I find that I only use about half as much 1201 Glyptal as a cover coat on 9574 as I had to use over the varnish I had been using, and I get higher gloss and better bonding."



Here's A Bulletin You Should Have! If you haven't yet tried G-E 9574 get in touch with your local G-E Distributor, or write for our new bulletin to Section K3, Chemical Department, General Electric Company, Pittsfield, Massachusetts.

You, too, can put your confidence in

GENERAL  ELECTRIC

Section K-3
Chemical Department
General Electric Company
Pittsfield, Mass.

Please send me your free bulletin "The Cost-Saving Insulating Team."

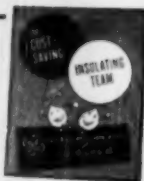
Name _____

Business _____

Address _____

City _____

Zone _____ State _____

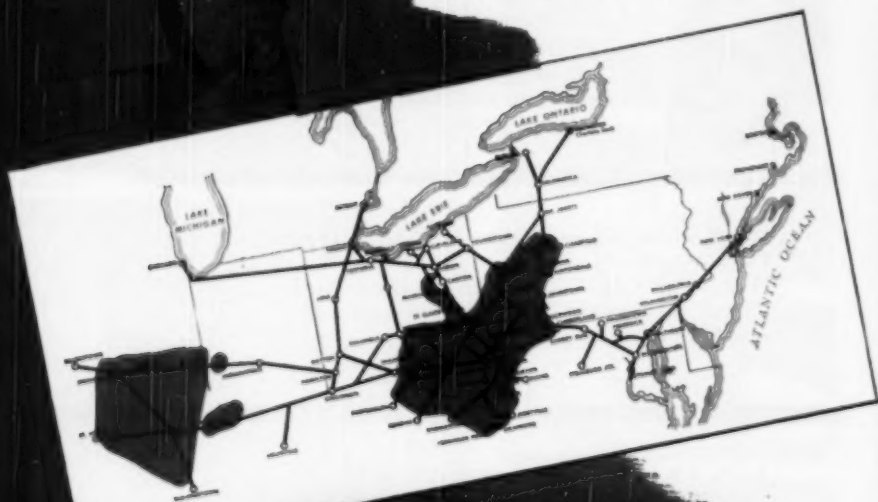


Back your belief in

Just as America's greatness has been built on Bituminous, America's future depends on it.

The advantages of this vital fuel are based on solid facts; we must get these facts across to the public. Only by an aggressive promotion of the value and economy of Bituminous can we reach and hold the dominant position in the fuel and energy market which Bituminous deserves.

We all believe in Bituminous; if together we constantly repeat the facts, we can make it an increasingly popular fuel!



BITUMINOUS COALS FOR EVERY
BALTIMORE &

Bituminous—we do!

LET'S LOOK AT THE FACTS:

1. The vast coal supply under America's surface is the world's greatest resource.
2. Coal is the safest, surest, most dependable and economical fuel that money can buy for space heating, power, and light.
3. Coal is a clean-burning fuel when properly used.
4. Its storage advantages, in season and out, are invaluable.
5. Modern coal-burning equipment is every bit as automatic and efficient as the equipment used by competing fuels.
6. If consumers are clearly shown the advantages of coal—with emphasis on its dependability, more will choose it than will choose any other fuel. During peace or war, it can adequately meet the nation's needs for heat and energy.

Here is what the B&O is doing to promote the benefits of Bituminous:

- ① Constantly offering buyers sources of efficient, economical, well prepared, and properly sized coals in wide variety.
- ② Backing the merchandising efforts of its progressive producers by various forms of modern publicity.
- ③ Aiding research projects to improve the efficiency of coal and to broaden its use.
- ④ Spending millions of dollars on modern coal-handling facilities so that we can offer dependable service in speeding coal distribution.

*Our bet's on Bituminous...:
help us back it with action!*

COALS ARE FOUND IN ABUNDANCE ON THE B&O

BALTIMORE & OHIO RAILROAD

Constantly doing things—better!



HOWLAND HOOK, Staten Island, N. Y.



COAL FACILITIES, Toledo, Ohio



COAL FACILITIES, Lorain, Ohio



CURTIS BAY, Baltimore, Md.

ONE Grease for ALL



**"Yes—One Grease,
One Gun and
A Better Job too!"**

Here is a versatile grease that can be used with absolute confidence wherever lubrication is needed—chassis, wheel bearings, water pumps, universal joints, etc., in winter or summer—under all kinds of operating conditions.

*These 4 Severe tests prove
SINCLAIR LITHOLINE
is better than any single grease!*

SCENE: Sinclair's Research Laboratories, Harvey, Ill.

CAST: Two commonly-used greases of highest quality; a calcium soap chassis lubricant and a sodium soap wheel bearing grease; and Sinclair's Litholine.



WATER RESISTANCE TEST!

Samples of each grease are heated in beakers of water. Near boiling, the sodium grease disintegrates into soapy water and oil. Shortly after boiling the calcium grease shows foamy emulsion as grease absorbs excess water. Litholine remains unaffected, proves its superiority in combating wet conditions.

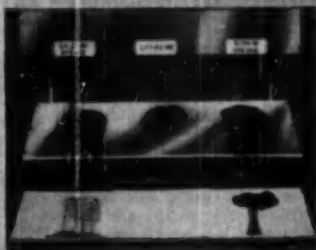
SINCLAIR REFINING

Lubrication Jobs!

LOOK WHAT ONE-GREASE-ONE-GUN LUBRICATION MEANS TO YOU...

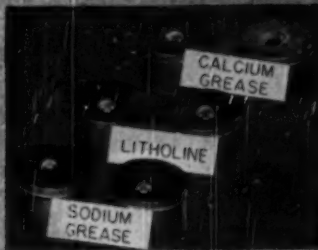


- 1 Superior protective lubrication
- 2 No danger of misapplication
- 3 Less chance for contamination
- 4 Reduced time-out for lubrication and maintenance
- 5 Fewer servicing man-hours
- 6 Less wastage
- 7 Fewer dispensing units
- 8 Smaller grease inventories
- 9 Simplified purchasing and distribution
- 10 A finer grease at every lubrication point



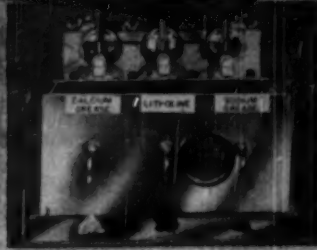
HEAT-RESISTANCE TEST!

The samples are heated on a plate. At 190° F., the sodium grease disintegrates. At 240-350° F., the sodium soap structure collapses and releases the oil. Bearing failures would follow. At 380° F., Litholine shows no effects, proves superior for high temperature lubrication jobs.



MECHANICAL STABILITY TEST!

Worked (worked) samples are placed beside samples of unworked greases. Steel balls are dropped. Distance ball sinks in worked samples shows increase in softness—loss of stability. The calcium grease showed greatest increase in penetration, the sodium grease next. Litholine showed no difference whatever... proving its superior mechanical stability in service.



LOW TEMPERATURE PUMPABILITY TEST!

Lever-type grease guns are filled with sample greases and cooled. At 20° F., it is impossible to pump the sodium grease. At 0° F., it is impossible to pump the calcium grease. But Litholine still pumps in good volume! Yet Litholine is a heavier (harder) grease. Thus, Litholine has the body for summer service yet is pumpable in severely low temperatures.

COMPANY

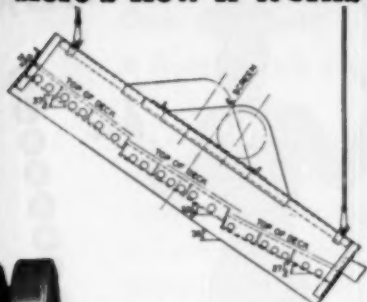
For lubrication counsel, or more information on Litholine, see your nearest Supplier of Sinclair Products, or write to Sinclair Refining Company, 620 Fifth Avenue, New York 20, New York.

GET HIGH CAPACITY, ACCURATE SIZING Handling Moist Coal

NEW RIPL-FLO SCREEN WITH "Tri-Slope" DECK!



Here's How it Works



- ▶ The first section of the screen deck is sloped steeply for quick stratification, rapid conveying.
- ▶ The center section is set at less slope to slow down conveying rate.
- ▶ The discharge end section is set at a flatter angle than the second section to further reduce the rate of material travel.

The "Tri-Slope" deck can be used for screening moist coal in $\frac{1}{2} \times 0$, $\frac{3}{8} \times 0$ and $\frac{1}{4} \times 0$ sizes containing up to 4% surface moisture. Available in 3×9 , 4×9 , 5×9 and 6×9 ft sizes. Single deck or single deck with conventional top deck. Send for Bulletin 25B6280B.

Ripl-Flo and Texrope are Allis-Chalmers trademarks.

Now—Allis-Chalmers offers you a vibrating screen with a new deck designed to control rate of material travel for more efficient screening of small size moist coal.

Ripl-Flo screens with new "Tri-Slope" deck feature a deck divided into three sections, each at a decreasing slope to provide a high rate of travel at feed end to reduce bed thickness and obtain rapid stratification... a retarded conveying rate on the second section... a further re-

duced rate at the discharge end as the bed becomes thinner, to pass marginal pieces through the screen.

"Sta-Kleen" deck construction makes it possible to screen coal with higher surface moisture than was previously considered practical... and get increased screening capacity.

Special shaped rubber balls bounce between the screen surface and a ball retaining deck located several inches below the screen cloth. These balls dislodge damp particles clinging to the screen cloth.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A-9099

Sales Offices in
Principal Cities in
the U. S. A. Distributors
Throughout the World.



Motors



Controls



Texrope Drives



Vibrating Screens



Crushers



Kilns, Coolers, Dryers





How many oils and greases do you use at the face?

You need only

two

1. Gulf Mining Machine Lubricant

for lubrication - it does the job
of 2 or 3 other lubricants

2. Gulf Journal Oil

for hydraulic systems

With Gulf Mining Machine Lubricant and Gulf Journal Oil you can service almost any mining machine—you eliminate as many as 3 oils and greases! Thus your lubricant storage and handling are greatly simplified and you avoid application errors at the face.

Gulf Mining Machine Lubricant and Gulf Journal Oil not only do the job of several other oils and greases, but do it better! Gulf Mining Machine Lubricant has a heavy body to insure less leakage from gear cases; exceptional adhesiveness that prevents throwoff or channeling; high lubricating value that insures less wear; and it resists the washing action of water.

Gulf Journal Oil gives outstanding protection against wear for hydraulic pumps—maintains system efficiency!

Call in a Gulf Lubrication Engineer today and ask him to explain in detail how these two Gulf

quality products for cutting and loading machines can give you effective help in your efforts to increase tonnage and reduce costs. Write, wire, or phone

Gulf Oil Corporation · Gulf Refining Company

GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses

Located in principal cities and towns throughout
Gulf's marketing territory



12 to 50 tons per man per shift with *LOW INVESTMENT COST*



36-inch McCarthy Coal Recovery Drill
with Lump Drill Head
(Auger retriever and auger hoist not shown)



REPRESENTATIVES

Capitol Equipment Company, Inc.
1134 Market Street
Harrisburg, Penna.

Diamond Supply Company
Evansville, Indiana

A. T. Green Machinery Co.
Box 9538
Pittsburgh 23, Penna.

Mine and Contractors Supply Co.
930 Second Avenue
Birmingham, Alabama

Nixon Machinery Company
Carter at 13th Street
Chattanooga, Tenn.

O. Philipp & Company
(Export Agents)
19 Recter Street
New York 6, New York

Rish Equipment Company
Box 1260, Richmond, Va.
Box 353, Charleston 22, W. Va.
Clarksburg, W. Va.
Box 1369, Roanoke, Va.
Box 269, Bluefield, W. Va.

Union Supply Company
1401 Wazee Street
Denver 2, Colorado

W. W. Williams Company
835 Goodale Blvd.
Columbus 8, Ohio

R. A. Young & Son, Inc.
301 So. 10th Street
Fert Smith, Arkansas

• Many successful mine operators credit McCarthy Coal Drills with tremendous new savings in time and money.

Recent reports from the Coal Salvage Company show that, with a 36-inch auger, the powerful McCarthy unit, running almost maintenance free, delivers 130 tons of coal during each 7½-hour shift for an average daily rate of 32½ tons for each of the 4-man crew.

With a 24-inch auger and a 3-man crew, average daily output amounts to 55 tons or 18½ tons per man.

The versatile McCarthy Coal Drill has plenty of extra power for handling 12, 16, 20, 24, 30 and 36-inch diameter auger sections with a smooth, steady bore that penetrates to almost any depth.

McCarthy Coal Drills can be equipped with electric, gasoline or diesel motors for both deep mine and stripping operations.

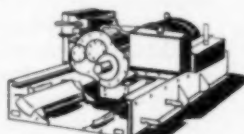
Write today for the full story on this remarkable new money-maker.



Lump Coal Recovery
Drill Head



Coal Recovery in Highwall



Underground Coal Recovery Drill

Lower your costs with these McCarthy shot-hole Drills

● McCarthy Blast Hole Drills bore shale and rock formations to produce deeper and truer blast holes in less time with less effort.

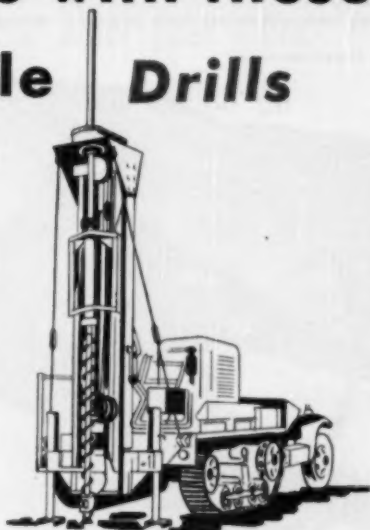
McCarthy Drills have heavier, more ruggedly built frames, with finger-tip controls, heavy-duty transmissions and alloy steel gears and shafts. Each unit is provided with an abundance of power, supplied from gasoline, diesel or electric motors.

Simplified designing permits increased mobility of both horizontal and vertical models . . . makes McCarthy the favorite in the field . . . the top performer of them all!

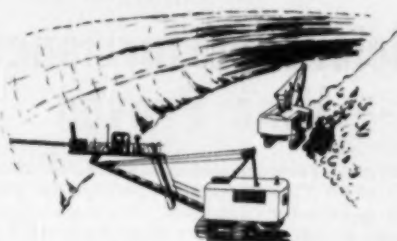
For high speed, high level drilling, there's the McCarthy Horizontal Drill for mobile mounting; there's a Self-Propelled, highly maneuverable unit for drilling blast holes close to the floor or bottom; and a compact, powerful Vertical Drill with a hydraulic tower that folds flat for travel.

Each of these McCarthy Drilling Units was developed for a specific job. Rigid tests prove conclusively that McCarthy Drills produce more footage at less cost than any other drills on the market.

Make the Salem Tool Company headquarters for all your drilling needs. Write now for information about how McCarthy Drilling equipment can increase your production and lower your blast hole drilling costs.



Vertical Drill Mounted on Half Track



Horizontal Blast Hole Drill Mounted on Shovel Boom



Truck Mounted Blast Hole Drill



Self-Propelled Blast Hole Drill



Vertical Blast Hole Drill

COMPANY

AVE., SALEM, OHIO, U.S.A.



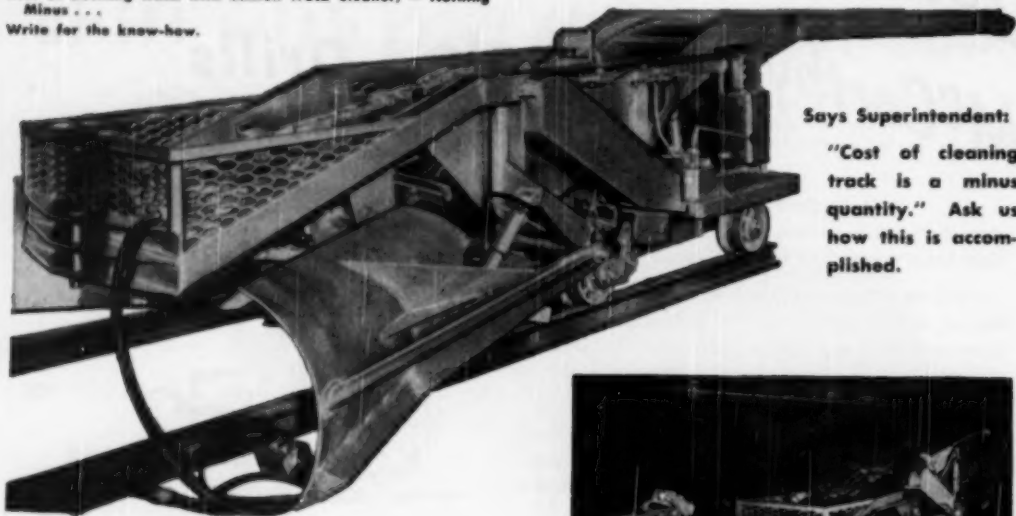
The Year's *GREATEST* Money Maker!!

Cost liquidated within twelve months . . .

Track cleaning, a nightmare, converted into a profitable operation . . .

Cost of cleaning track with Canton Track Cleaner, — Nothing Mines . . .

Write for the know-how.



Says Superintendent:

"Cost of cleaning track is a minus quantity." Ask us how this is accomplished.

Efficient Performance —Mine Proven

OF all recent developments in mechanical mining, the Canton Track Cleaner is perhaps the greatest money maker—per "use-time." No track workers to get hurt. Clean tracks once thoroughly with the Canton Track Cleaner. Then subsequent cleanings yield good coal. Load cars higher, haul more tonnage. Reclaim spillage mechanically. Write us for name of nearest mine where you can make inspection.

Digger plate raised or lowered by hydraulic pump. Wings adjusted up or down, in or out, independent of each other. Front conveyor floating type, handling large rock. Boom conveyor can be raised or lowered. Machinery protected with shear pin, quickly changed. Standard Wings clean 51 inches from center of track gauge. Extensions to wings permit cleaning wider space. Length 21 ft., width to conform to haulway. Weight 6,500 lbs.



Clean Tracks at a Profit . . .

Performance Records . . . will do more work than 20 men by hand . . . Salvaged coal up to 45 ton has been gathered in one shift . . .

Salaried foremen at some mines clean the tracks on off days with profit. 10-ton cars on dirty track loaded in 9½ minutes each.

Write for complete data, using street and zone numbers.

American Mine Door Company
2057 Dueber Ave., Canton 6, Ohio

"It seems like everybody's now talking lowest-cost-per-mile."

"Yes, but Goodyear proves it by the fact that year after year more tons are hauled on Goodyear tires than on any other kind!"



You can't beat these tires
for coal hauling!

HARD ROCK LUG

For tire-bruising, heavy-duty off-the-road work this super-rugged tire is tops. Its tough armored carcass and extra-husky lugs assure more wear, better performance no matter how tough the going is.

ROAD LUG

For trucks that operate both OFF and ON the road, this dual-purpose tire is best. Tough construction and special tread design provide super-traction off the road—long, smooth mileage on the road.

To cut your costs, always BUY and SPECIFY Goodyear tires—it pays! They're FIRST because they're BEST!

GOODYEAR

Road Lug—T. H. The Goodyear Tire & Rubber Company, Akron, Ohio



When you compare



KOEHRING

COMPANY
Milwaukee 16, Wis.

Subsidiaries: JOHNSON • KWIK-MIX • PARSONS



"KOEHRING WORK CAPACITY"

**Ask your Koehring
Distributor for
specific information**



7¾ to 79½ TONS lift capacity . . . ¼ to 2½ yards dipper capacity

OLD KING COAL



is a wise old soul,

yes, a wise old soul is he.

It's important for him to get there whole,
so he travels by

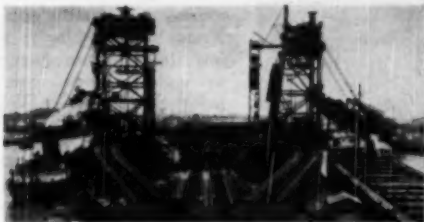
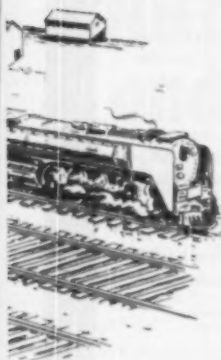
N.Y.C.!



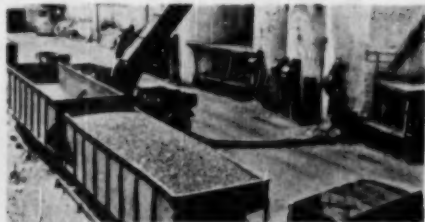
Smooth Service at the Mines! In the last 2½ years alone, Central has added almost 60 miles of new hopper and gondola cars, with more than 475,000 tons capacity, to its great coal-carrying fleet. You can depend on cars enough... spotted promptly at the mine siding... picked up promptly, too.



Smooth Trip, Mine to Lake, is the rule with Central's crews. Trains move smoothly from mine fields and junctions in Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia... delivering loads in top shape at Toledo, Ashabula, Chicago and Oswego docks.



Smooth Transfer from Train to Ship! Ample receiving yards. Radio-controlled switching. Ship-to-dock radio. Flood lighting for night operation. All these mean speed. But just as important is the gentleness of the giant, electric car dumpers... designed to handle coal with minimum breakage.



Smooth Delivery for Home and Plant! Both directly and via the Great Lakes, Central's modern 11,000-mile rail network links the mine fields with world's richest coal market. The 11 states and 2 Canadian provinces served by Central have over 60% of America's industry and coal-heated homes.

Coal Transportation Experience At Your Call!

For expert aid with coal shipping or supply needs... as well as for help in developing and expanding coal properties... contact any New York Central coal traffic representative listed below:

H. L. WILLARD, Coal Traffic Manager, New York, N. Y.; P. P. BELTZ, Coal Traffic Manager, Cleveland, Ohio; R. K. HORTON, General Coal Freight Agent, New York, N. Y.; F. P. SOEN, General Coal Freight Agent, Chicago, Ill.; R. E. ROGERS, General Coal Freight Agent, Pittsburgh, Pa.; A. W. BEHRENS, General Coal Freight Agent, Detroit, Mich.; G. W. CHILDERS, Coal Freight Agent, Cincinnati, Ohio.

NEW YORK CENTRAL COAL TRAFFIC DEPARTMENT

General Offices: 466 Lexington Ave., New York 17, N. Y.

LARGEST OWNERSHIP OF STEAM LOCOMOTIVES AMONG CLASS 1 RAILROADS



YOU CAN PILE UP YARDAGE FASTER and at LOWER COST with **Firestone** **TIRES**



IT'S THE MOVING UNIT that piles up the yardage . . . The idle unit piles up expense!

YOU CAN KEEP YOUR UNITS MOVING more hours on the job with Firestone Tires. You can pile up more yardage in less time because Firestone tires stand up under a greater amount of punishment . . . keep going over a longer period of time.

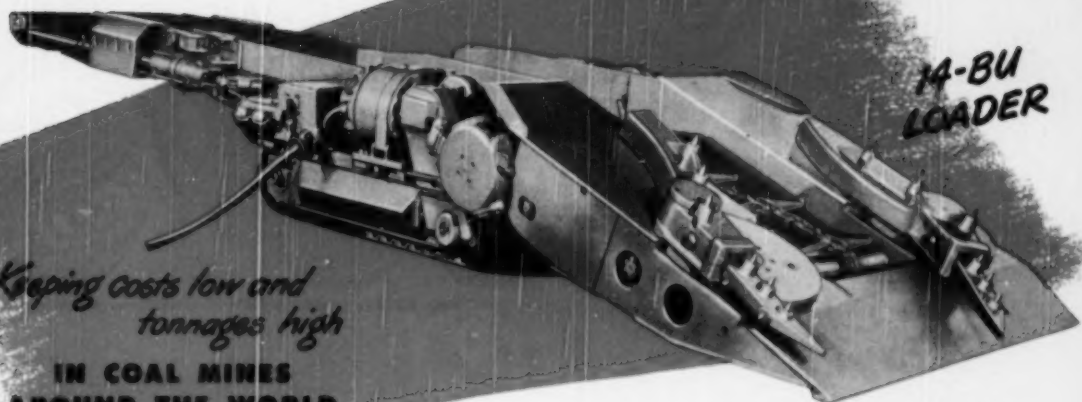
FIRESTONE TIRES cost you no more than ordinary tires . . . cost a lot less than the downtime you have with other tires.

TRY THEM and you'll find that for dependability . . . for durability . . . for all-out performance and downright value, you just can't match Firestone Tires.

*Listen to the Voice of Firestone
every Monday evening over NBC*

Copyright, 1956, The Firestone Tire & Rubber Co.

WHEN YOU BUY NEW EQUIPMENT
Specify **Firestone TIRES**



**14-BU
LOADER**

*Keeping costs low and
tonnages high*

**IN COAL MINES
AROUND THE WORLD**

The JOY 14-BU Loader is a high production, low vein machine with a capacity up to 8 tons a minute. Produced in heights of 30 1/2", 33" or 36," economical in operation and rugged. Like all JOY Loaders, it is highly flexible, with a chain conveyor that swings 45° to either side.

JOY

LOADERS, CUTTERS, SHUTTLE CARS and MOBILE COAL DRILLS

Illustrated on this page is a typical JOY "team" of high-production mining machines for thin-seam trackless operation. In soft or hard coal—no matter what your mining conditions are—you'll realize greater efficiency and economy with *field-proved* JOY Equipment . . . built by the world's largest producer of underground mining machinery.

**11-RU
GUTTER**

JOY Trackless Universal Cutters—the 11-RU for low coal and the 10-RU for thick seams—are highly maneuverable, fast, hydraulically controlled machines that can make horizontal or shear cuts anywhere in the face.



LICENSED UNDER THE PATENT
TO E. C. MORGAN NO. 1,893,325

**6-SC
SHUTTLE
CAR**

The JOY 6-SC Shuttle Car is ahead of anything in its class in safety features and operating advantages. Only 29" high for thin seams—has four wheel drive, four wheel steering, hydraulically adjustable elevating discharge.



JOY Mobile Coal Drills are highly maneuverable, fast-tramming units that feature an exclusive, automatic, infinitely variable control of both rotation and feed in drilling. The CD-25 is a single-boom, hydraulically controlled, 36" drill for average conditions. The CD-26 is a twin-boom model.

**CD-25
COAL
DRILL**



Write for Bulletins, or

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

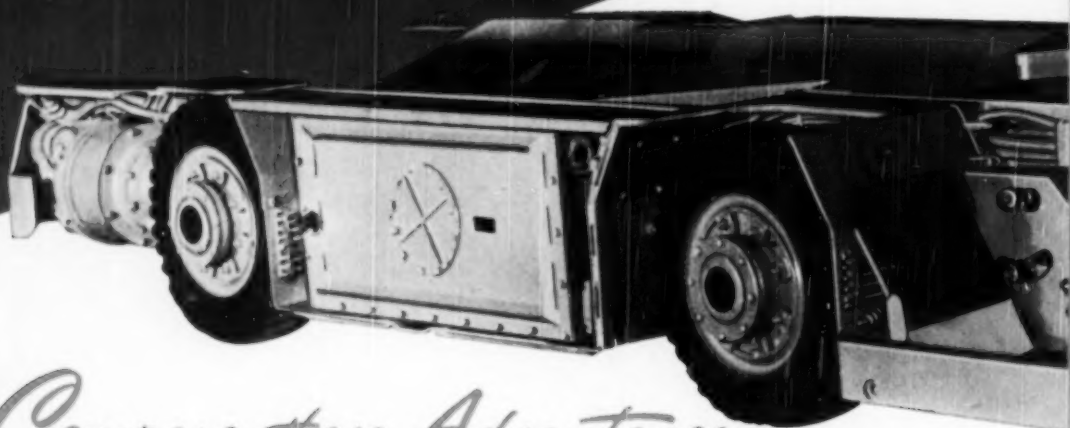
W40 CL 3046



*Ahead of
Anything
in its class!*

JOY'S

6-SC



Compare these Advantages—

Only the New Joy 6SC has them all . . .

All Developed by Joy Research, and Proved in the Field

DISC-TYPE BRAKES

The JOY 6-SC has smooth, positive braking action, without locking or grabbing. No adjustment is required for the entire life of the lining disc, since the braking area is automatically compensated for wear. JOY Disc-type Brakes can be re-lined four times as fast as internal-expanding brakes, have far fewer parts, and are unaffected by dirt, coal dust, oil or water.

EXTRA-LONG WHEEL BASE

Less pitching when tramping over rolling bottom, due to its extra-long wheel-base, permits the JOY 6-SC

to operate with a minimum of roof clearance. This highly modern low-seam shuttle car is inherently more stable and can operate in thinner coal than other cars of equal capacity.

SAFETY DIRECTIONAL CONTROL

In the 6-SC, the operator must face the direction of travel to operate the tramping motors, minimizing the risks that can occur in shuttle cars lacking this safety feature.

DOUBLE-SAFE STEERING

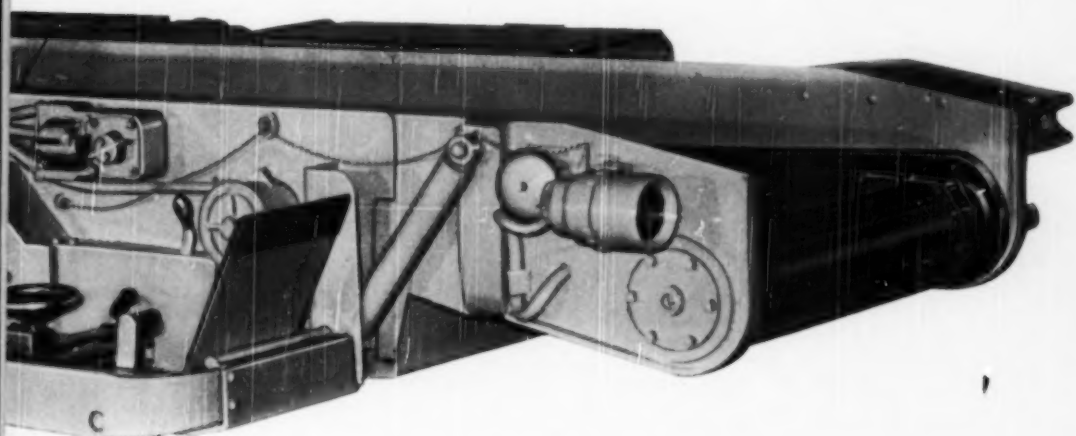
JOY Shuttle Cars are equipped with hydraulically-boosted mechanical steering—much safer than straight hydraulic, and much easier to con-

trol than straight mechanical steering. If hydraulic pressure is lost on JOY Cars, the operator still has complete control mechanically. Also, a JOY Car has steering "feel," like an auto . . . the wheels turn farther or less as the control is moved farther or less.

EXCLUSIVE SAFETY SEAT

A desirable feature in low-seam operation—the operator's seat in the the JOY 6-SC tips back and "straightens out" when light force is applied to the top of the back of the seat, placing the operator in an unrestricted position in emergency.

1950 MODEL SHUTTLE CAR



MERCURY-TUBE CONTROLLER

JOY Shuttle Cars are equipped with patented *Magnetax Control*—specifically designed and built for mining duty, not adapted from industrial control. This control employs sealed, mercury-tube interlocks for tramming and accelerating. These interlocks are unaffected by dirt, moisture, acid condensation, fumes, etc., and inevitably require less maintenance than any mechanical type of interlocks.

PLASTIC-FILLED MOTOR ARMATURES

This feature in JOY Cars reduces maintenance and motor failures because it assures the best electrical insulation and firmly bonds the armature coils in place. The coils are prevented from shifting because of vibration, or because of the rough usage imposed by constant reversing in shuttle car service.

EXTRA-LARGE CABLE REEL

The larger cable capacity of the JOY 6-SC permits it to operate over

longer distances than other cars in its class. Also, the JOY Cable Reel is 2-step hydraulically driven for smoother, more reliable operation.

ADDITIONAL FEATURES

- ★ Four-Wheel Steering
- ★ Four-Wheel Drive . . . Positive Drive on each wheel assures traction under worst bottom conditions.
- ★ Two-Speed Controllable Tramming
- ★ Hydraulically-Adjustable Elevating Discharge

Write for Bulletin, or

Consult a Joy Engineer



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Just like taking out insurance
on men, machines and cable

Mines "SPB" Connector
with intrinsically-safe
control circuit, for gas-
eous mines.

JOY SAFETY CIRCUIT CENTERS and "SPB" BIGUN CONNECTORS

Complete Line Available



All SCC units are equipped with "Mines" Connectors—moisture, oil and wear-resistant—available in a complete range of sizes and types.



Above: Low Height SCC with Permissible Housing, for thin-wall gaseous mines. Single and multiple-outlet types.

Above: Full Height SCC with Dust-Resistant Housing. The Permissible unit for high coal is shown in top of page.

Right: Low Height SCC with Dust-Resistant Housing, for entries and non-gaseous operations in thin seams.



Here is packaged wiring—"Mines"-built Safety Circuit Centers used with "Mines" Electrical Connectors for individual power take-offs—by far the best and most efficient power distribution system for modern mining machinery. These SCC units not only give you maximum protective value, but maximum productive machine time as well . . . and they're fool-proof, trouble-free, and completely portable. Built in low or high coal models, with permissible or dust-resistant housings, in sizes and current ratings to match any mining requirement. • Let us show you how "Mines" SCC units and Connectors can give you another boost on the road to greater production and lower costs!

W&O ME 3042

Consult a Joy Engineer

for complete details and prices



MINES EQUIPMENT — MINES Division

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

You can have both...

SPEED and SAFETY with SUPERIOR 5600 Drill Arm and 5100 Drill

Since Dooley Bros. first introduced the electric powered coal drill in 1924, safety and speed have been engineered into every new, improved model. Now they offer to the mining industry one of the fastest and safest electric drills on the market today.

Dooley Bros. armature exchange assures you of fast efficient service. Send us your damaged armatures for replacement with completely rebuilt and inspected equipment.



DOOLEY BROS.

1201 S. Washington St.
Peoria, Illinois

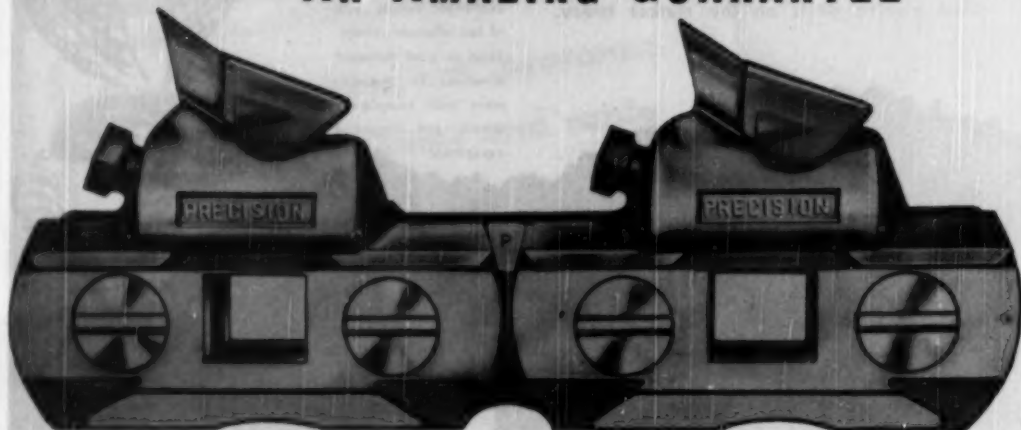


"for Better Cutting Action"

PRECISION engineered

FOR THE ROUGHEST CUTTING JOBS—BY MEN OF ALMOST 30 YEARS
EXPERIENCE—PRECISION CHAINS BY THEIR PERFORMANCE THE PAST
FOUR YEARS HAVE EARNED THEIR RIGHT TO

AN AMAZING GUARANTEE



GUARANTEED—To operate with less expense for bit holders under all conditions, than any other factory-bit chain.

GUARANTEED—Uneexcelled smoothness of sumping and cutting, under all cutting conditions.

GUARANTEED—Stamina to stay on the job without break down under all conditions. Without time limit any broken link or holder will be replaced.

GUARANTEED—to relieve destructive coring which often beats other chains to pieces prematurely.

GUARANTEED—to relieve the headache of lost bits and bit-holders, too often experienced with bits and holders of other designs.



"The Customer is Right"

"These bits cut our best former cost in half."

"Precision has the finest bit and holder ever used in a cutter chain."

"Bit holder cost with Precision chains is only a tenth the cost with others."

"Our Precision chain shows no sign of coring—by this time former chains would have been beaten to pieces."

"We cut and shear and average $3\frac{1}{2}$ Precision bits per place—when using conventional bits there were times when all bits had to be changed to complete one shear."

"Twice-run power tests proved 40% power saving with Precision."

THE PRECISION ROCKBUSTER BIT (actual size)

Big secrets of Precision success—those Raring lateral blades that overlap across bit tracks to perfectly shield all holders and links—also to dissipate point-heat and prevent drawing its cutting temper of almost high-speed hardness.



PRECISION CHAIN COMPANY

Precision chains and bits are patented and U.S. and foreign patents are pending.

TERRE HAUTE, INDIANA



"REINEVELD" *Centrifugal* FINE COAL DRIER...

For more than 20 years the "REINEVELD" centrifugal coal drier has been used successfully in Europe. Over 250 of these driers are in operation in Holland, Belgium, France, Germany and England.

Now, for the first time in the United States, this compact unit has been put into operation at Piney Fork mine of the Hanna Coal Co., Jefferson Co., O. Wet coal (25-30% moisture) is fed to the annular space between the screen basket and scraper, both rotating in the same direction at high speed. However, there is a differential motion between the

scraper and basket as the scraper is retarded relative to the screen basket. This relative motion transports the fine coal downwards while it is spun and the water is removed through the screen openings. End moisture of the cake is 3-7% depending on moisture content and amount of very fine slurry in the feed.



Capacity 50-75 tons per hour ($\frac{1}{4}$ " x 0)
Less degradation of the coal
 Less floor space (6 ft. x 6 ft.)
 Less total height (5'0")
 Less weight (11,000 lbs.)

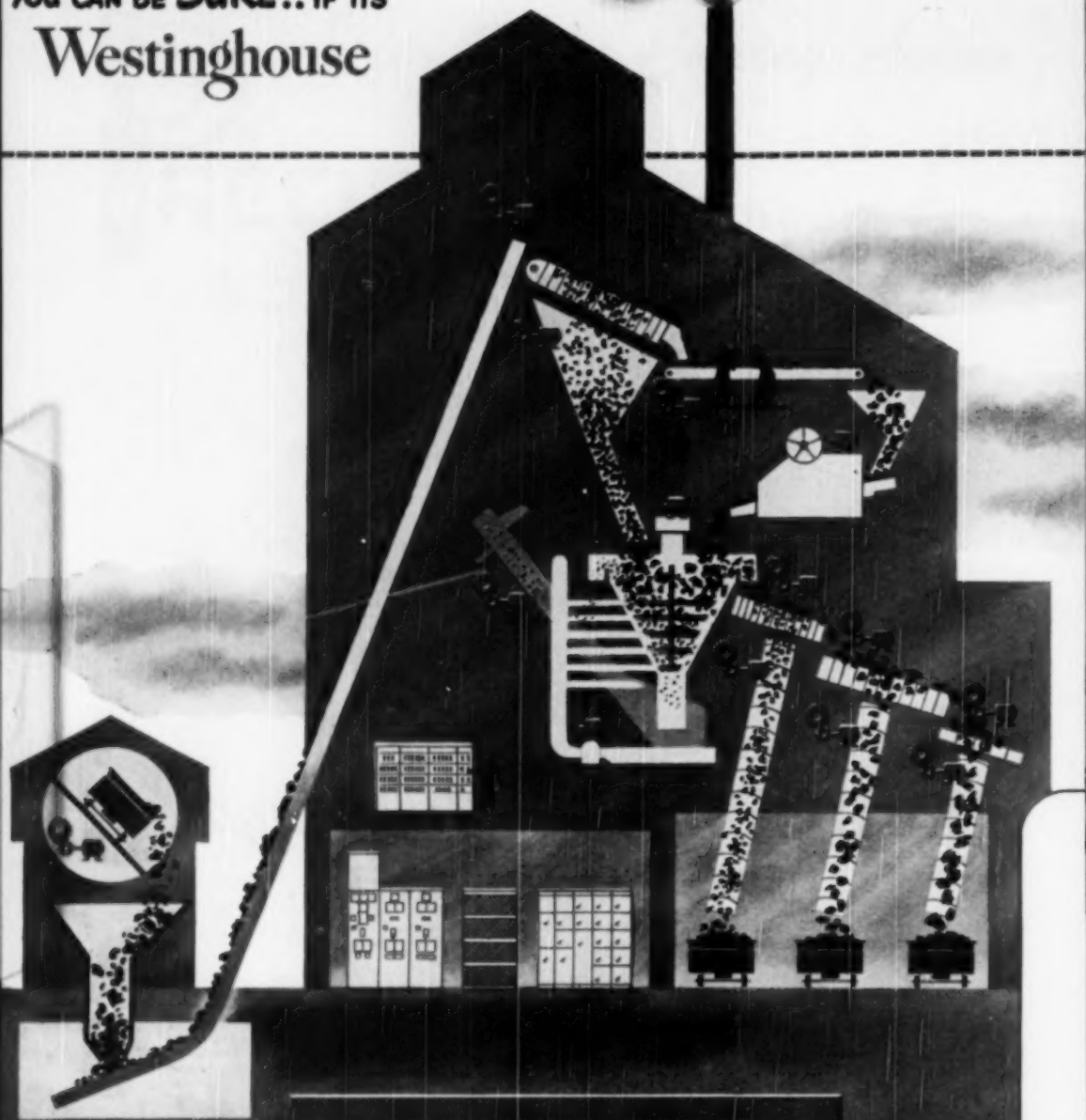
Less moisture in dried coal (3-7%)
 Less horsepower required
 Lower installation costs
 Lower maintenance costs

Direct or V belt drive.

Write for folder for complete details.

M. G. Driessen *Sole Agent*
 1507 First National Bank Bldg. . . . Pittsburgh 22, Pa.

YOU CAN BE **SURE**.. IF IT'S
Westinghouse



Westinghouse

EQUIPMENT FOR
THE MINING INDUSTRY



Here's Proven Electrical Apparatus

TO HELP YOU CLEAN COAL AT LOWER COST

Figure it on a tonnage basis. When the electrical apparatus is right, your Preparation Plant runs more efficiently—turns out more coal for each kilowatt-hour you pay for. There are fewer outages—you get more tons per man-hour of labor. Equipment needs less maintenance—more coal is cleaned per dollar spent on repair.

Make sure the apparatus you buy will be right for your plant. Check it on these two points: 1. Has the equipment been proved in Preparation Plant service? 2. Will it be engineered into a co-ordinated system to meet your *particular requirements*?

When Westinghouse supplies the equip-

ment, you get a Yes on both counts. We've handled the complete electrical requirements for a great many Preparation Plants—including the world's largest. Westinghouse apparatus has been thoroughly proved in service. And our Mining Industry Engineers know how to help co-ordinate equipment into an efficient, low-maintenance operation. From the planning stage on, they work with you and your machinery builders.

When you build a new plant, rebuild or add on to your present operation, let us help. You'll get a plant that cleans more coal at lower cost. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

SYMBOLS SHOW TYPICAL PLANT APPARATUS



Power Center, high voltage—Main power inlet containing high-voltage switchgear. Supplies the ASL Transformer and high-voltage motors. Required number of metal-clad cubicles are combined in one unit.



ASL Air-Cooled Transformer—Mounted between Power and Control Centers. This saves space, wiring. Safety's high, too; internal buses, wiring troughs are used. Most important, there's no liquid to burn or explode.



Control Center, low voltage—Takes low-voltage power from ASL Transformer. Contains switchgear, starters, relays for all low-voltage motors; each unit in its own cubicle. Highly compact but flexible arrangement.



Pushbutton Control Station—Here, one man can control every driven operation in the plant. Interlocks provide sequence-motor-starting, when desired. Mounting is flexible, designed to meet your requirements.



Speed Reducers, Gearmotors—Westinghouse makes a full line. For any application, you get the required drive speed at the most efficient motor speed. Gear teeth get the exclusive BP Taper-Hardened treatment.

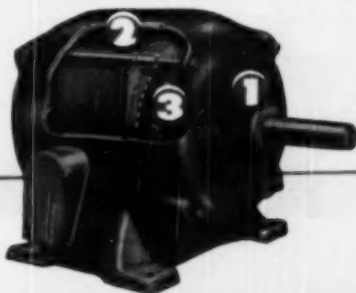


**Life-Line Motors Cut Outages 50%
Save \$7.50 Per Motor Per Year**

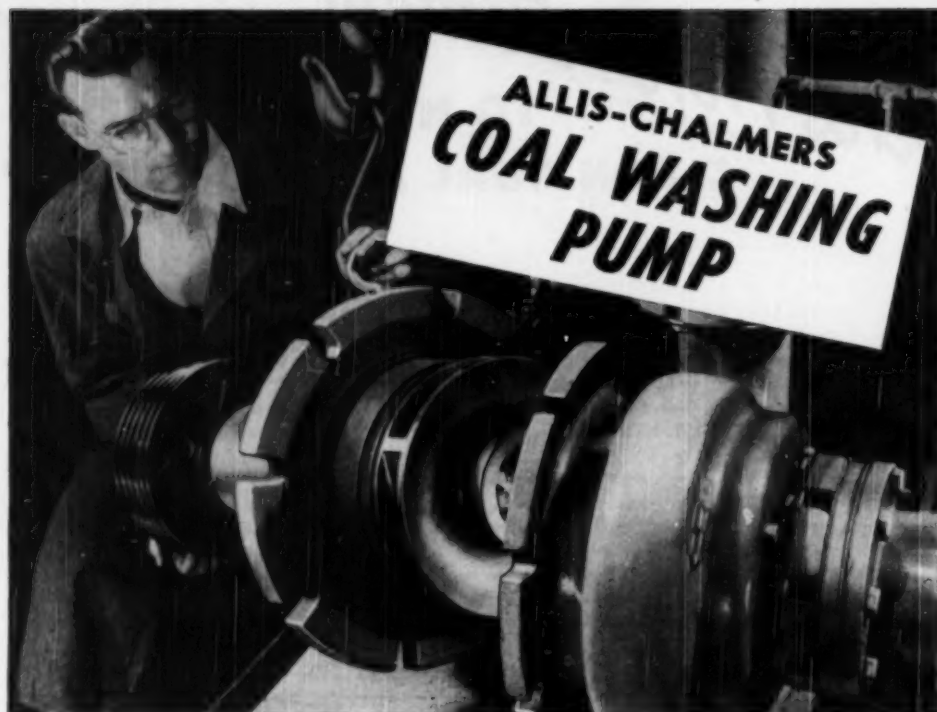
An independent survey of all motor types showed that the new Westinghouse Life-Line Motors have 41% fewer bearing failures per year, cut outages from all sources in half and, all told, save \$7.50 a year per motor. They're especially suitable for many Preparation Plant applications.

1. **No Lubrication Needed**—Bearings are pre-lubricated and factory-sealed. Coal dust can't get in. There's no lubrication problem for inaccessible motors.
2. **Stronger Mechanically**—Life-Lines are all steel. They're rugged. Working parts are far better protected against shock.
3. **Stronger Electrically**—Six layers of patented Tuffernell insulation protect the Tufvar windings, give you maximum insulation strength.

J-94807



Only 1/2 Hour to Service!



ALL COAL WASHING PUMPS require periodic replacement of worn parts. This "CW" (coal washing) pump saves you money because parts replacement is easy, fast and economical. The entire pump can be dismantled and reassembled in a half hour without disturbing piping.

Parts with varying rates of wear are separated. Only worn parts need be replaced. Three sets of bearings, brackets and shafts cover entire range of pump sizes . . . reducing parts inventories as much as 2/3!

USERS REPORT LONG WEAR

Experiences of coal operators prove that the combination of *Allisite*, an abrasion-resistant alloy, *heavier construction* and expert *application engineering* give the "CW" pump longer wear between servicings. Users say:

"Inspection and lubrication have been only expenses on our A-C coal washing pump in 10 months of operation."

"After 13 months operation, two and three shifts, we have just replaced impeller on A-C coal washing pump."

Allisite is an Allis-Chalmers trademark.

"A-C coal washing pump still delivers full flow after pumping slurry with 50% solids for 8 months." An A-C representative will be glad to give you additional facts and figures on possible savings for you. Or write for Bulletin 6381.

A-2765

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.



ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.



ALLIS-CHALMERS

BOWDIL

COAL CUTTER CHAIN and BITS

ONE-PIECE
BIT HOLDER

BOWDIL
BITS

BIT-CARRYING
BODY SECURELY
WELDED TO
CHAIN

HEAVY
SHOULDERS
ON LINKS
CARRY
LOAD

SET SCREW
LOCKS BIT
HOLDER

LARGE
HEAT-TREATED
PINS

Made by the makers
of the



**STRONGEST CUTTER-BAR
IN THE COAL INDUSTRY**

HEAVY-WALL
HARDENED
BUSHING

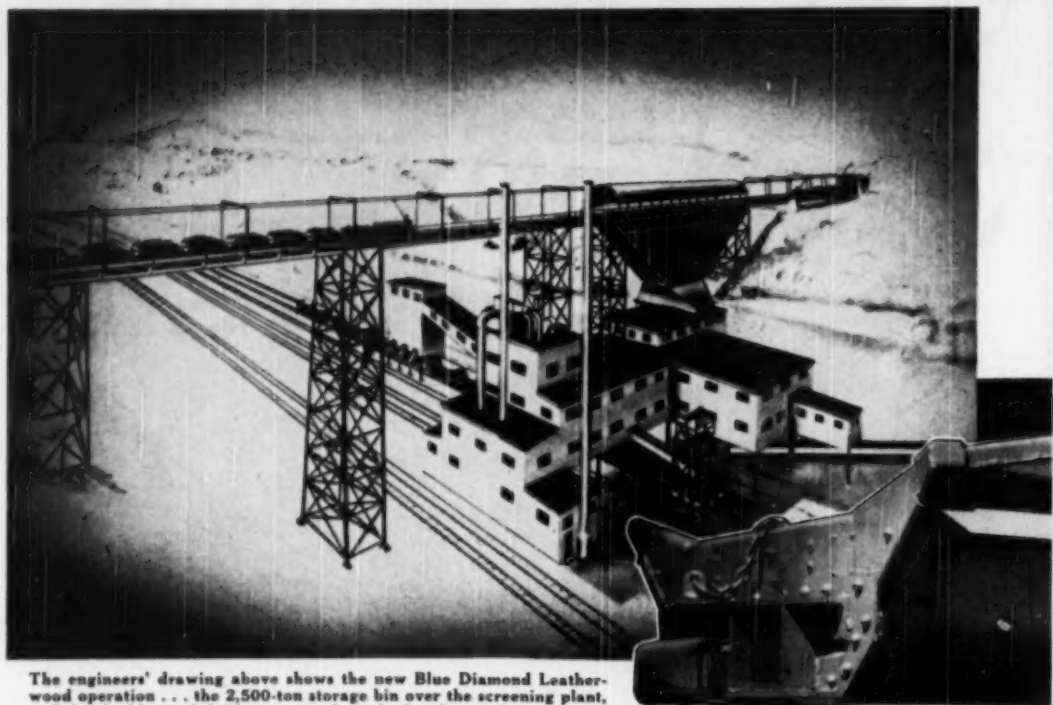
RADIAL
TRACK
GUIDES

DROP-FORGED
LINK AND
CONNECTOR

INGENIOUS
RIVET
LOCK

THE **BOWDIL**
COMPANY
CANTON, OHIO

BLUE DIAMOND'S *Leatherwood..*



The engineers' drawing above shows the new Blue Diamond Leatherwood operation . . . the 2,500-ton storage bin over the screening plant, and the double-track bridge to portals on both sides of the gorge. It is one of the most outstanding structures of its kind in the United States . . . a design of beauty as well as maximum production efficiency. Roberts and Schaefer, Chicago, are the engineers and contractors.

S - D 1 - 2 - 3 "AUTOMATICS" IN SERVICE AT LEATHERWOOD

In addition to approximately 200 S-D "Automatics" transferred to Leatherwood from the Bonny Blue mine there are 140 12-foot, and 390 16-foot S-D 1-2-3 "Automatics," all new cars, in service . . . a total of approximately 700 cars. This is proof of the efficiency of S-D "Automatics" well known by a firm with years of experience using them.

For complete information on how S-D "Automatics" can step-up your production and cut haulage costs, write today!

**S A N F O R D - D A Y
K N O X V I L L E**

... one of the world's greatest coal producing ventures ... on the way to "New Mining Horizons"

Operation of Blue Diamond's Leatherwood, Ky., Mine Starts With Over 500 New S-D 1-2-3 "Automatic" Drop-Bottom Cars!

Blue Diamond Coal Company, well known as one of the coal industry's most progressive operators, has set its new Leatherwood mine capacity at 8,000 tons daily. A special feature of this new ultra-modern and efficient operation is the 2,500-ton storage bin built directly over the screening and cleaning plant. This

storage bin permits three-shift operation of mine with only two-shift operation of screening plant because S-D 1-2-3 "Automatics" can fill the bin to track level.

Five hundred and thirty new S-D 1-2-3 "Automatics," like the one shown below, completely dust-sealed for safety and savings, in addition to nearly 200 S-D "Automatics" transferred from Bonny Blue mine, serve Leatherwood's haulage requirements.

For record-making haulage — dumping-on-the-move . . . for low cost operation day-in and day-out, no other car can match the S-D 1-2-3 "Automatic" system of haulage in coal mining.

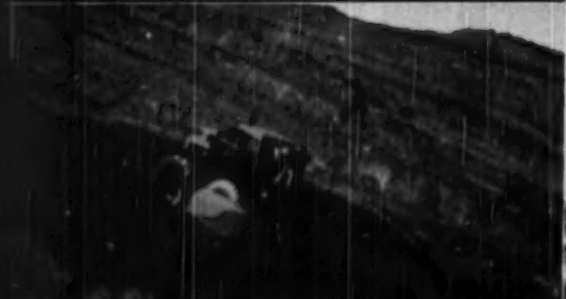


I R O N W O R K S
T E N N E S S E E

2 **TOURNADOZERS** *on Cuyuna*



Builds Roads - Tournadozer builds, maintains truck roads. Fast accurate grading is made possible by finger-tip electric controls, easy steering.



At Dump - Tournadozer's big blade rolls large load of sand each pass. Constant-mesh transmission keeps rig rolling without loss of momentum.

Mobile, rubber-tired "C's" on job 24 hours a day, 7 days a week

One of the large iron mining companies operating on the Cuyuna Range near Crosby, Minnesota, found its two C Tournadozers ideally suited to the extensive round-the-clock pit and dump work necessary for efficient stripping.

They have permanently assigned one of their mobile rigs to a large sand overburden dump. Here, in addition to leveling truck-dumped loads, "C" maintains haul roads, grades sides of dump, and assists trucks through sand when going is tough.

The second high-speed Tournadozer . . . detailed to handle utility jobs .9 to 2.7 miles



**See your LeTourneau Distributor
NOW for complete information**

speed stripping *Range*

Doges Overburden — Tournadozer's multiple-disc air brakes, instant controls, and sure four-wheel traction permit it to work safely on steep grades of dump.

apart . . . in one typical 8-hour shift, cleaned around two large shovels . . . cleared ore bed for new shovel location . . . swept spillage from hopper . . . and graded old track location for haul road to proposed dragline site.

Travel everywhere at high speeds

Both of these rubber-tired rigs travel anywhere on or off location — over pavement, cross-country, or over railroad tracks — without damage to surface, rails, or tires. Their high speeds forward and reverse complete dozing cycles in $\frac{1}{3}$ the time it takes slow-moving crawlers. These are only two of the many reasons why Tournadozers meet the multiple needs of this Cuyuna Range mine and why you, too, should investigate this modern rubber-tired dozer for extra speed and *plus* profits. Find out the many other uses for the Tournadozer. Your local LeTourneau Distributor can give you all the facts. Phone him TODAY!

Rubber-tired Tournadozer travels anywhere at high speeds — on pavement or cross-country — through sand or soft mud — over railroad tracks without plinking.



Sweeps Around Hopper — Short turn radius, extra maneuverability, easily operated blade, make Tournadozer ideal for clean up at hopper.



Cleans Ore Bed — Dozing in third gear, Tournadozer completes three cycles to crawler's one — quickly cleans bed for new shovel location.

LETOURNEAU
MERRILL, ILLINOIS



TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

CARBOLOY

Pioneer cemented carbide manufacturer in the United States
World's largest manufacturer of cemented carbides

guarantees you coal-mining tools of uniform high quality

THERE IS ONE all-important thing to remember in selecting your coal-mining tools.

This is it: *It is not the initial cost, but the performance delivered, that counts.*

And with mining tools of Carboloy Cemented Carbide, you always get uniform high performance and quality.

For only Carboloy is backed by 29 rigid quality tests—each one devised to assure you of getting the best carbides in the industry.

More, Carboloy offers you many other quality and service assurances—assurances that spell lower cost of drilling per ton for you. Here are some of the reasons why it is smart to count on Carboloy for quality:

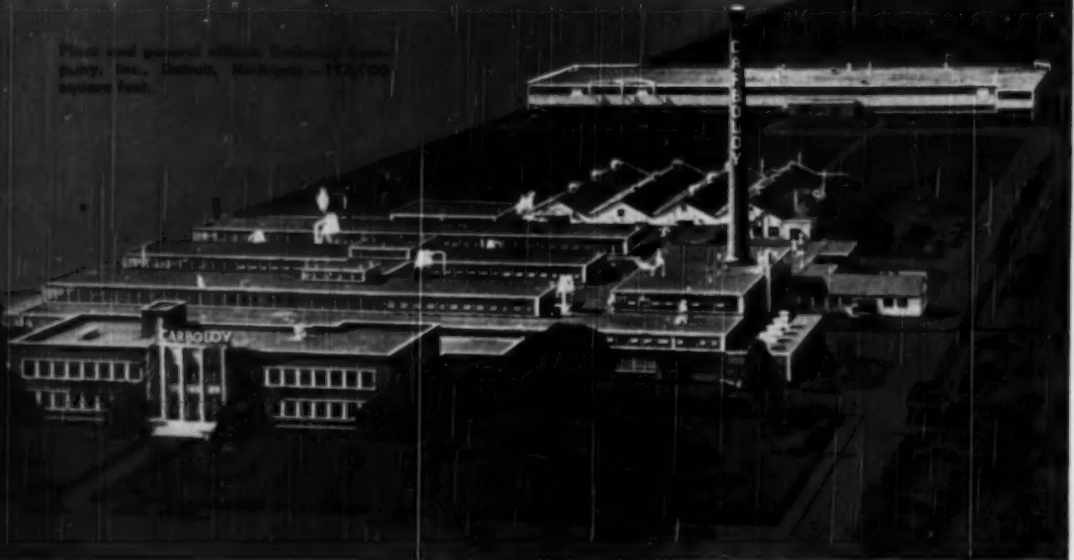
- 1 Carboloy's program of continuous grade improvement**—rather than changing grades for special purposes.
- 2 Carboloy's program of engineering and research**—the nation's largest and most complete facilities devoted to carbides.
- 3 Carboloy's unexcelled production facilities**—the finest in the world for mass production of cemented carbide tools.

If you're looking for lower drilling cost per ton; if you're looking for uniform high quality in all your coal-mining tools; if you're looking for true economy of operation, you'll do well to look to Carboloy. Remember: Not the initial cost, but the performance delivered, counts. And Carboloy delivers top performance always.

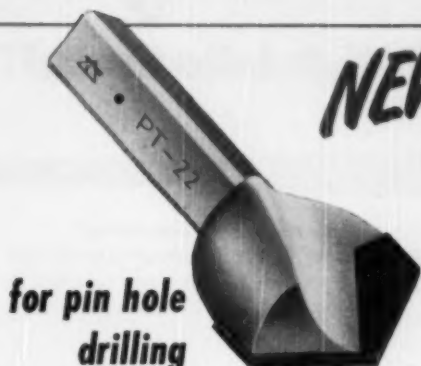
CARBOLOY COMPANY, INC.

11120 E. 8 Mile Road, Detroit 32, Michigan

Plant and general offices, Carboloy Company, Inc., Detroit, Michigan—112,000 square feet.



FOR LOWER DRILLING COST PER TON



NEW! Improved Carboloy Pin Timbering Drill—

Fast, easy drilling in hard slate, shale and laminated limestone. Extra dividends in reduced equipment costs and handling time. Carboloy's Pin Timbering Drill offers you this, and more, too.

This improved drill is tipped with Carboloy Cemented Carbide, the hardest metal made by man. It assures maximum speed in medium roof drilling, and develops faster drilling speed than pneumatic methods. Check these points: improved flute design, removes cuttings faster; alloy steel body, for greater strength; plus a carbide tip that will drill more holes.



Carboloy's Improved Auger Drill Bit — for faster, easier drilling

Unbeatable—you'll slash coal drilling costs right and left with this improved auger drill bit. Ideal for post, mounted and push drills. Look at this:

- o Maximum clearance and relief angles permit freer, faster cutting.
- o Improved spiral prevents packing of coal cuttings.
- o Uniform high-quality carbide throughout entire tip. Assures longer bit life.
- o Long tips of Carboloy Cemented Carbide permit many more regrinds.

PLUS o Forged alloy steel shank—heat treated.

Carboloy's Improved "Finger Bit" — for strip, underground mining



Ideal for use in hard-to-take-hold-of medium ground! Provides real gouging action. Fits all standard auger drill heads using $\frac{1}{2}$ " bits. Check these plus values:

- o Faster cutting due to larger clearance angle on shank.
- o Drills more freely.
- o Less pressure required.
- o Uniform high quality throughout entire tip. Assures longer drill life.

PLUS o Forged alloy steel shank—heat treated.

Carboloy's Mining Machine Bit— with 8 important advantages



Not only do you get top carbide quality, top performance and top efficiency, but you get these 8 big plus advantages with this Carboloy mining machine bit:

- o Shank level with insert, for free flow of coal.
- o Less shank steel to grind, yet adequate insert support.
- o Less carbide to grind; faster grinding, greater tip economy.
- o Smaller point affords less power consumption.
- o Forged alloy steel shank resists bending, permits set screw clamping.
- o No shoulders; set to any gauge size within range of uses.
- o Maximum hold through combination of braze and mechanical holding.
- o Approximately 50% greater thickness of insert at cutting edge.

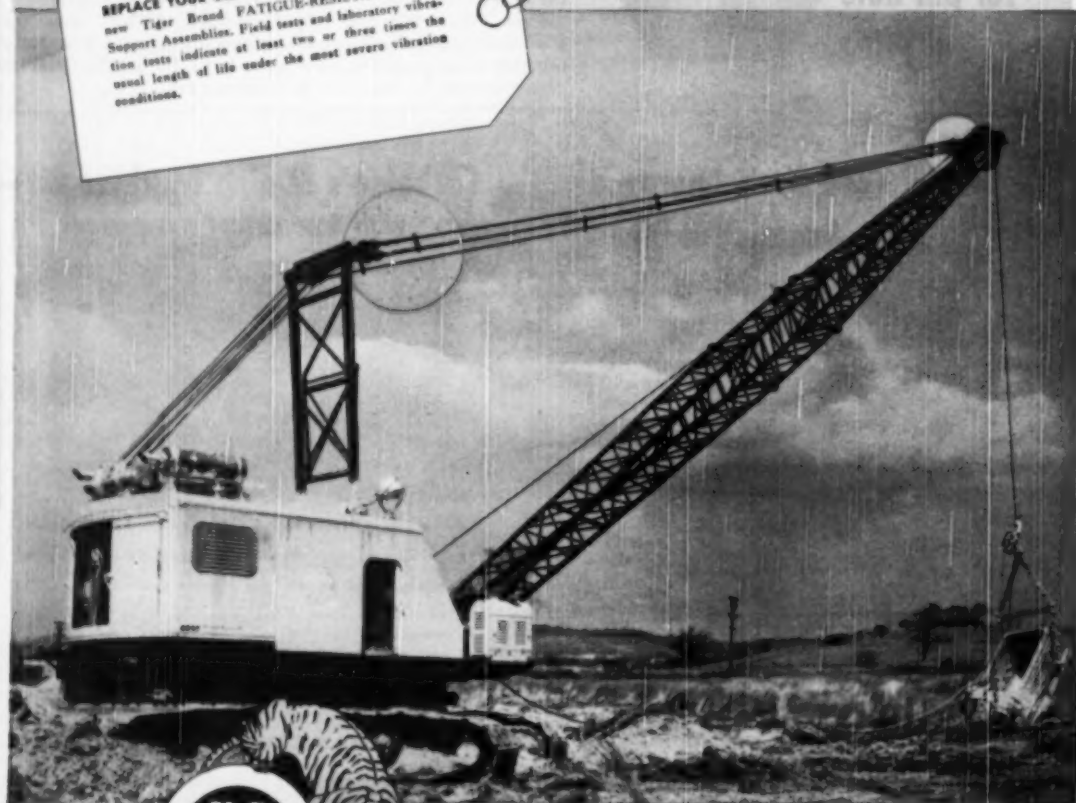
CARBOLLOY
CEMENTED CARBIDE
FOR STRIP AND MINING MACHINES

2 to 3 times longer

with these new Fatigue-Resistant

REPLACE YOUR OLD BOOM SUPPORTS with these new Tiger Brand FATIGUE-RESISTANT Boom Support Assemblies. Field tests and laboratory vibration tests indicate at least two or three times the usual length of life under the most severe vibration conditions.

An exclusive development of
AMERICAN STEEL & WIRE COMPANY



NEW TIGER BRAND FATIGUE-RESISTANT BOOM SUPPORT ASSEMBLIES on a
5 cu. yd. dragline near Pittsburgh, Pa.

life for boom supports

Tiger Brand Cable Assemblies

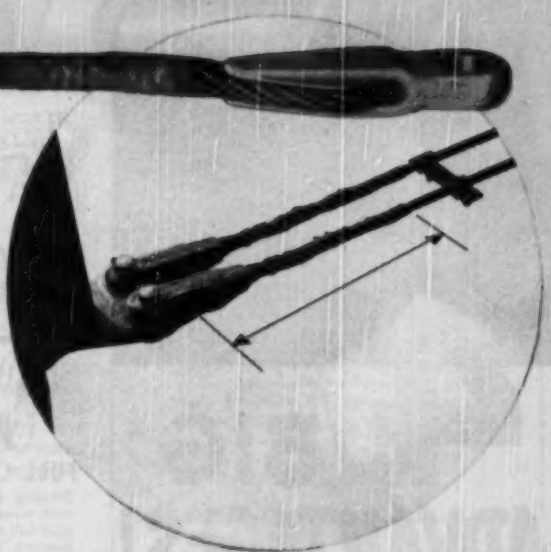
● Here is an "innovation" in boom support assemblies that effectively combats the most severe vibration on power shovels, draglines and cranes. Notice the novel thimble design which embodies an interwoven eye and open end pendant easily and quickly interchangeable on standard equipment.

This new design dampens vibration instead of concentrating it at one point. The result is two to three times longer life for boom supports and much greater safety.

The new boom supports are especially adaptable to installations where fatigue failures occur adjacent to sockets. They can be easily and quickly adapted to your present equipment because essential dimensions such as pin diameters, distances between ears, etc., are the same as for standard open and closed sockets.

Fatigue-Resistant Boom Supports are an exclusive development of American Steel & Wire Company. Send the coupon for complete information.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES, CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM,
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



VIBRATION EFFECTIVELY DAMPENED HERE over a long section instead of being concentrated at one point.

American Steel & Wire Company
Rockefeller Building, Dept. J-70
Cleveland 13, Ohio

Please send me complete information on your new Tiger Brand Boom Support Assemblies.

Name.....

Title.....

Company.....

Address.....

City.....State.....



AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL



4 BIG ADVANTAGES!

MAGIC GRIP SHEAVE

YOU CAN MOUNT a *Magic Grip* sheave faster than any other sheave you can buy . . . and demount it just as fast. When you mount a *Magic Grip* sheave it runs true. It will not slip or jam. It always comes off easily.

Even if you don't change sheaves often, you should have *Magic Grip* sheaves on every drive to eliminate the possibility of shaft and bearing damage when ordinary sheaves are hammered or pried on or off.

WIDEST V-BELT LINE

Get everything you need for your V-belt

drives from one reliable source. *Texrope* offers the broadest line of V-belts, standard and variable speed sheaves and speed changers in the industry. And you also get the extra engineering skill that comes from having more industrial V-belt installations than any other manufacturer.

Get your copy of the 144 page *Texrope* Pre-Engineered Drive Manual from your A-C Authorized Dealer or Sales Office or write for Bulletin 20B6956.

A-3022

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

Texrope and *Magic Grip* are Allis-Chalmers trademarks.

ALLIS-CHALMERS



ONE PIECE MOUNTING

Bushing and sheave go on together. One motion mounting. Alignment is easier. Sheave is on right first time.

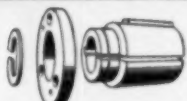
Key here
Key here



No strain
on screws

POSITIVE DRIVE

Bushing is keyed to both shaft and sheave. No slipping. No sheared screws. No jammed bushings from bent screws.



FULL CIRCLE GRIP

Bushing split full length with separate collar. Grips shaft full length around full diameter. No forcing or distortion. Grip easily broken. No hammering.



WIDE SIZE RANGE

Magic Grip sheaves are available from 3" pitch diameter up. Style NC bushing for smaller sizes and Style C bushing for larger sizes.

Sold . . .

Applied . . .

Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.



MOTORS — 1/2 to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters, push button stations and components for complete control systems.



PUMPS — Integral motor and coupled types from 1/2 in. to 72 in. discharge and up.



Never Before SUCH POWER . . .
Never Before SUCH VALUE . . .
 in Chevrolet P*L Advance-Design Trucks

America has learned to expect the most from Chevrolet. And now the line that outsells all others brings truck users still more: More power—to make light of maximum loads. More value—to make sure of minimum costs.

Everywhere—on every kind of job, every kind of road—these new P*L models are proving themselves the greatest of a great line. Yet Chevrolet trucks are notably low in price and in operating and maintenance costs. No wonder that year after year Chevrolet trucks are the Nation's Favorite!

CHEVROLET MOTOR DIVISION, General Motors Corporation
 DETROIT 2, MICHIGAN

LEADING WITH ALL THESE PLUS FEATURES:

- TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load • THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy action engagement • SYNCHROMESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—5 times more durable than spiral bevel type • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • ADVANCE-DESIGN STYLING with the "Cab that Breathes" • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—precision built.

CHEVROLET
P*L*

ADVANCE-DESIGN TRUCKS

P*Popularity Leaders

Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—proof of the owner satisfaction they have earned throughout the years.

P*Performance Leaders

The new Chevrolet P*L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

P*Payload Leaders The rugged construction and all-around economy of Chevrolet P*L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P*Price Leaders The Chevrolet truck line is the very lowest priced line in the field—saves on initial cost. What's more P*L trucks give owners dollar and cents savings in maintenance and operation.





**2000
TONS PER HOUR
METALLURGICAL
AND STEAM COAL**

**what have
they in
common?**

**50
TONS PER HOUR
DOMESTIC COAL**

**BOTH USE HEAVY-MEDIA SEPARATION TO
PRODUCE PRECISE "SPECIFICATION COAL"
DEMANDED BY TODAY'S CONSUMERS**

Only Heavy-Media Separation can offer all these important advantages:

1. **Precise Separation:** Closely duplicates washability curves. Specific gravity of medium can be held within $\pm .01$ of optimum separating gravity, thus assuring highest possible recovery, particularly of near-gravity material that would be lost by less precise methods.
2. **Wide Gravity Range:** Separation at any predetermined gravity from 1.25 to 2.50. Separating gravity constantly maintained, but can be easily and accurately changed within a matter of minutes to meet changing characteristics of feed coal or shipping specifications.
3. **Cleans Full-Size Range.**
4. **Handles Large and Varying Amounts of Refuse Without Loss of Efficiency.**
5. **Handles Wide Variations in Feed Rate:** No loss of efficiency due to surges as much as 50% above normal.

AMERICAN *Cyanamid* COMPANY

6. **Not Affected by Feed Interruptions:** Shut-downs or start-ups do not cause loss of bank coal or result in temporary production of unsaleable, dirty coal.
7. **High Speed Separation:** Stop-watch checks on marked pieces prove that separation is made in seconds. Less chance for disintegration of coal and refuse.
8. **Simple Operation by Small Crew:** Unskilled operators can be quickly trained to run the Heavy-Media Separation unit efficiently. Some plants operated by only one operator and a part-time helper.
9. **Low Medium-Consumption:** Reports from operating plants indicate medium loss to be as low as $\frac{1}{2}$ lb. to 1 lb. per ton of feed coal.
10. **Hand Picking May Be Eliminated.**
11. **Profitably Cleans "Middlings" from Older Cleaning Units:** Overall plant output and quality can be increased far out of proportion to the cost of Heavy-Media Separation unit.
12. **Quickly Available:** Complete prefabricated plants capable of cleaning sizeable tonnages available for prompt shipment and speedy erection by experienced engineering companies.

In two years—April 1948 to date—the use of Heavy-Media Separation has grown phenomenally. One plant of 250 t.p.h. then . . . 20 plants with 6,500 t.p.h. capacity now. And that total will undoubtedly be greater before this magazine is delivered to you!

American Cyanamid Company acts as Technical and Sales Representative for Heavy-Media Separation Processes . . . does not build cleaning plants. We do work closely with you and engineers of your choice in the design and initial operation of Heavy-Media Units, and are prepared to run carload tests on your coal in the Heavy-Media Separation pilot plant in the Cyanamid Mineral Dressing Laboratory. Correspondence is invited.

Pre-Publication Offer
Mineral Dressing Notes #18
COAL PREPARATION

This treatise on the use of Heavy-Media Separation, soon to be published, contains down-to-the-minute data on the process, test results, flow schemes, plant operating results and details of various types of separating vessels offered by engineering-construction firms. We will be pleased to send you a copy on request. The coupon is for your convenience.



Mineral Dressing Division
 AMERICAN CYANAMID COMPANY
 30 Rockefeller Plaza, New York 20, N. Y.

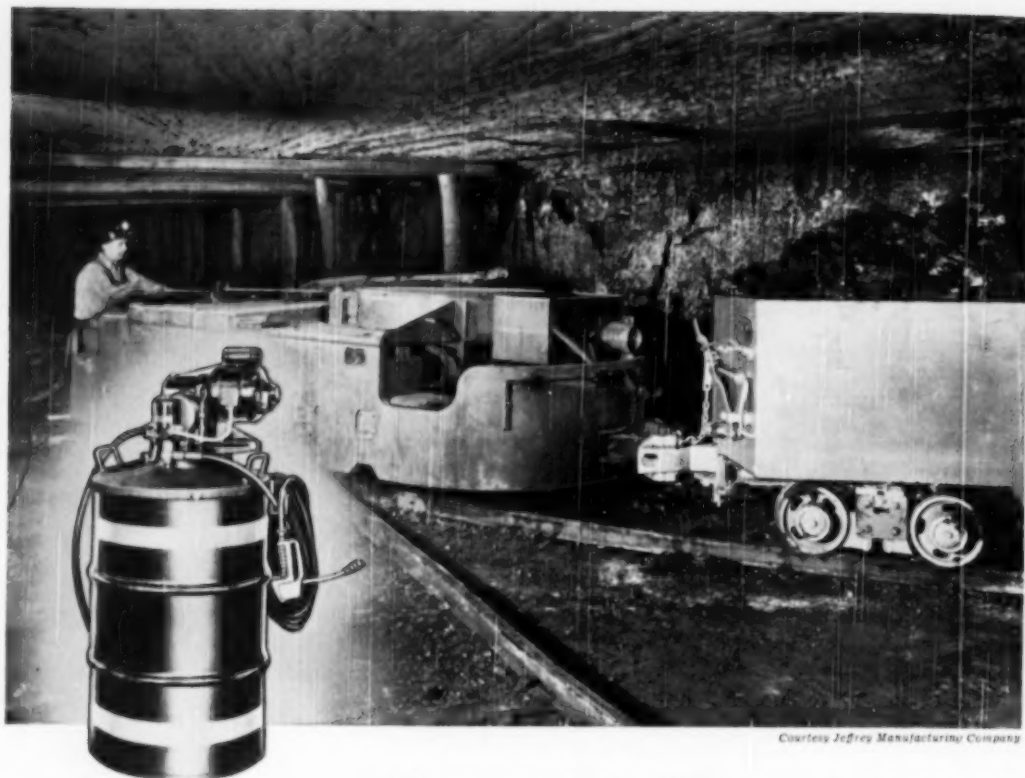
Kindly send me a copy of Mineral Dressing Notes #18
 "COAL PREPARATION".

Name

Company

Address

MINERAL DRESSING DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.



Courtesy Jeffrey Manufacturing Company

Save Time and Money at the "Paydirt" Level

WITH ALEMITE MECHANIZED LUBRICATION METHODS

In shaft or strip mining, coal dust and dirt are the worst problems you face in maintaining expensive equipment.

That's why Alemite lubrication methods are so important—to cut repair costs, keep lubricants free from contamination, and to save costly man-hours by faster, easier lubrication.

From barrel-to-bearing, Alemite equipment assures safe, fast, clean handling and application of grease and oil. With an Alemite pump in each drum, you can transfer lubricants rapidly, without waste or mess. Refinery-sealed lubricants are kept clean! Alemite loader pumps refill grease guns in seconds, saving time, saving grease! Vital machine bearings get clean, positive lubrication when you apply grease and oil with mechanized Alemite methods.

Above or below ground, Alemite pumps can be powered with air or electricity, to suit your individual needs. Modern Alemite methods assure positive lubrication for your mine cars and machinery. You get more trouble-free operation at minimum cost per hour!

WRITE NOW for complete details on how to cut your operating costs with Alemite lubrication methods and equipment—mechanized from barrel to bearing. Alemite, Dept. E-70, 1850 Diversey Parkway, Chicago 14, Illinois

ALEMITE

Lubrication Methods that Cut Production Costs

*Alemite
Cuts Costs
3 Ways...*



1. In Transferring Lubricants... by eliminating mess, expensive contamination—and cutting man-hours 63% for every 100 pounds of lubricant transferred.



2. In Loading Grease Guns... by saving 3½ man-hours for every 100 pounds of lubricant loaded into hand guns.



3. In Applying Lubricants... by saving up to 23.9 man-hours for every 100 pounds of lubricant applied to bearings.

For better
service
use the right rope



For rotary drilling,
PREformed, Internally Lubricated wire line designed to wind smoothly on drums and to withstand abrasion from running through blocks.



For logging operations,
tough flexible ropes for tractor arch lines, chokers, skidders and loading.



For shovels and draglines,
ropes for different sizes and types of equipment designed to give best service for your particular needs.

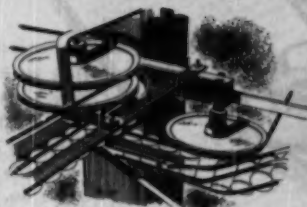
The right rope
for each job is
available from



For shaft mining,
shallow or deep, internally lubricated ropes to meet all load and speed requirements.



For cranes and hoists,
small or large, **PREformed** Internally Lubricated wire ropes of the correct size and flexibility for each use.



For can conveyors,
there are bright carbon steel, stainless steel and monel metal wire ropes to meet various service conditions.

A thousand and one
MACWHYTE
Internally Lubricated
WIRE ROPES

**It pays to choose the right rope
for your equipment**

Besides the ropes listed above, Macwhyte makes many more such as cable tool drilling lines, elevator cables, incline or haulage ropes, scraper ropes, aircraft control cable assemblies, ropes for ship

rigging and guying work, as well as hundreds of sizes and types of single-part, round-braided or flat-braided slings for material handling.

To get the best service, keep down maintenance costs, and save wire rope dollars, call your Macwhyte distributor or write direct to Macwhyte Company for recommendations. Catalog on request.

MACWHYTE WIRE ROPE

MACWHYTE COMPANY 2931 Fourteenth Avenue, Kenosha, Wisconsin Manufacturers of Internally Lubricated **PREformed** Wire Ropes, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Ropes. Our distributors and mill depots carry stocks for immediate delivery. Mill Depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles



This man knows what his wire rope costs him

He's quit guessing. Now he knows what his wire rope *actually* costs. He learned long ago that purchase price alone doesn't tell him a thing. So he devised a simple system of records—records that show the amount of work his ropes do, and their cost per unit of work.

This is something that Bethlehem has always recommended. To get a true picture of rope costs—an accurate picture—you should have figures showing the cost per ton-mile, yard of rock moved, or other unit that best applies to your business.

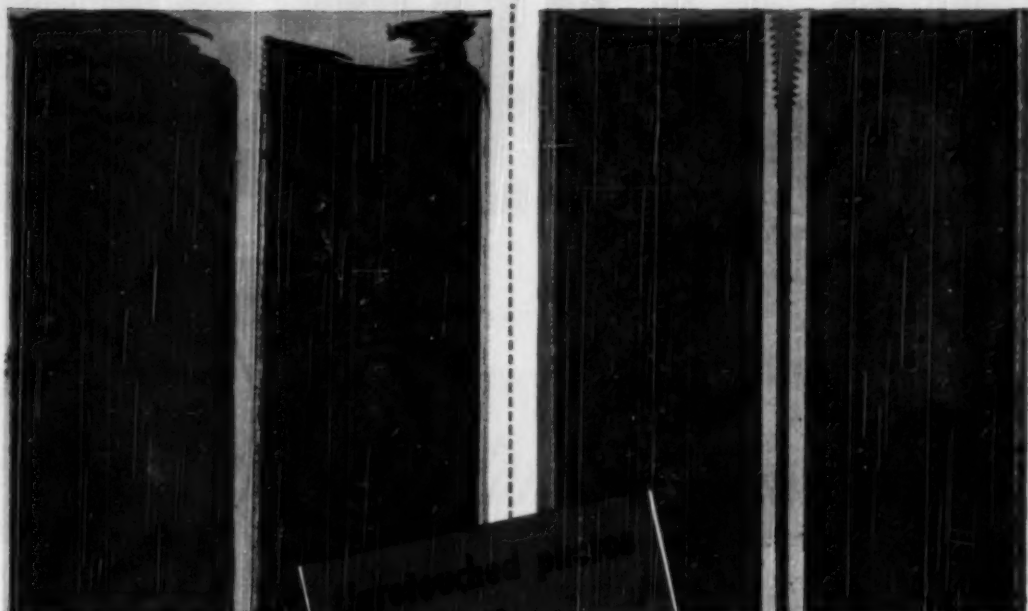
The keeping of such records is good, sound practice. Gives you a chance to compare rope values. That we like—for we're always ready to stack the Bethlehem product against all comers. You'll be, too—when you use this rope consistently.



**LET YOUR RECORDS
TELL YOU!**

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



Ordinary metal nipple after 6 weeks' carrying highly acidulous mine water.

Aluminum nipple, two months after replacing nipple at left.

Alcoa Aluminum Lasts

Where acid mine waters eat through ordinary metal pipe in weeks, Alcoa Aluminum Pipe will last up to ten times as long, or longer. Based on current pipe prices, you make money when it doubles pipe line life.

Easier To Install. Alcoa Pipe weighs one-third as much as heavy metal pipe. It needs fewer men to install, eliminates frequent replacement. In low seams (40" or less) aluminum actually costs less installed.

Strong—Resists Rock Falls. Alcoa Aluminum 63S Pipe won't grow brittle, withstands rock falls and rough handling.

Fittings Available. Use familiar standard methods and fittings for Alcoa Aluminum Pipe. No change in installation practices. Get the whole story on Alcoa Aluminum Pipe—call your Alcoa representative or send for free booklet.

ALUMINUM COMPANY OF AMERICA
1979G Gulf Building
Pittsburgh 19, Pa.

Gentlemen: Please send copy of your booklet, "Alcoa Aluminum Pipe", to



Name

Company

Title

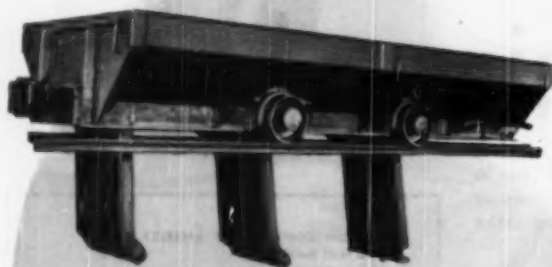
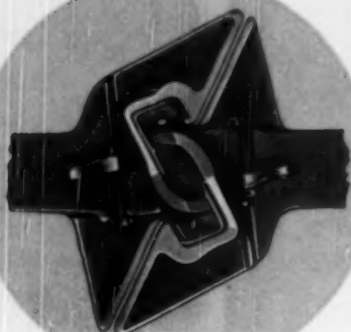
Company Address

City State

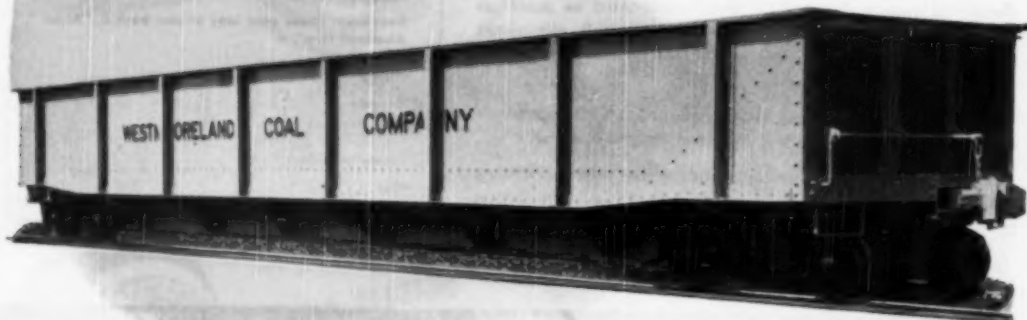
INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

"WE SET



At the new Saginaw Mine, operated by Oglebay Norton & Company, the drop-bottom mine cars are equipped with Willison Automatic Couplers, NACO steel wheels and integral draft rigging. Cars were built by Watt Car & Wheel Company.

The Hampton Mine of Westmoreland Coal Company employs 30-ton, drop-bottom cars, built by American Car & Foundry Company. These cars are equipped with Willison Automatic Couplers, NATIONAL Cast Steel Yokes and long-travel, high-capacity NATIONAL Rubber-Cushioned Draft Gears.



NATIONAL MALLEABLE AND
WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO

NEW RECORDS

for safety...speed...lower costs...with

WILLISON *automatic* COUPLERS"

That's the proven experience of operators who utilize mine and industrial cars equipped with Willison Automatic Couplers. From the first such car in 1927 to the most recent installation, Willison Automatic Couplers pay their way in safety, speed and cost reduction. Five important reasons account for this long record of performance:

1. MAXIMUM SAFETY—No manual assistance is needed for coupling, nor need workmen go between the cars for uncoupling.

2. FASTER HANDLING—Cars couple instantly on contact and can be uncoupled almost as quickly. Because Willison Automatic Couplers have wide gathering range and identical contours, no equipment needs to be reversed. No "one-way streets" for Willison-equipped cars.

3. HIGHER SPEED HAULAGE—Because Willison Automatic Couplers eliminate damaging slack, they permit higher speeds with maximum stability, and more protection for rolling stock. This smoother operation reduces surging,

spilling and danger of derailment. Consequently, these cars make more trips and handle more tons per day.

4. LOW MAINTENANCE COST—Two sturdy parts do all the work—the head and the lock. No pivoted hooks or knuckles—the coupler body takes the stresses without the interposition of a single movable part. Result—less wear and tear on both coupler and cars. This means reduced repair expense, less time out of service.

5. VERSATILITY—Willison Automatic Couplers are being used on almost every size and type of mine and industrial cars in wide varieties of applications.

These advantages of Willison Automatic Couplers have been proved for twenty-three years by leading operators of mine and industrial equipment. To get increased safety, more output per man per day per car, at lower cost, specify Willison Automatic Couplers for new cars or those you are rebuilding.

Write for circulars No. 1746 and No. 5240

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY
CLEVELAND 6, OHIO

STEEL CASTINGS CO.
STEEL LINKS AND SWIVEL HITCHINGS



WANT A KEEP OUT OF THE HOLE?



DODGE trucks are "Job-Rated" to cut hauling costs!

Here's a truck that will carry your loads over your roads at lowest cost. In fact, it will go even where there are no roads at all!

It's a Dodge "Job-Rated" truck! It has a "Job-Rated" engine to give you power to spare. It has a "Job-Rated" chassis—engineered and sized to your exact mine hauling needs.

Because it is "Job-Rated," you can count on it

to pull your loads from the mine quickly, easily and dependably.

Because it will be economical—both to operate and maintain—it will keep you out of the hole financially, too!

Ask your Dodge dealer about the good deal he can give you—right now—on a truck "Job-Rated" to fit your job, save you money!



With all their extra value **DODGE** "Job-Rated" **TRUCKS** are priced with the lowest



Achieves the long-sought V-BELT DRIVE for LOOMS

For Cotton Mills and Rayon Mills

Loom operators had long wanted a V-Belt Drive for their looms. But—

Stubborn Difficulties

—stood in the way. Gates over-came these difficulties through SPECIALIZED research in the world's largest V-Belt testing laboratories, thus providing—

Another Accomplishment For Industry

by Gates SPECIALIZED Research

THE extremely small diameter of pulleys over which loom drive V-Belts must flex under severe shock-loads posed a problem in V-Belt construction that seemed *insurmountable*.

But, with war-born synthetic fibers of unusual strength; and with man-made rubbers possessing engineering properties never available before—and with the great research and testing facilities available at Gates—a V-Belt was achieved that met the rigorous conditions of loom drive operation.

Then, a clutch of very advanced design was wanted—a clutch that would do *more*, with *less* mainte-

nance, and *fewer* troublesome adjustments than the clutches commonly used with gear and pinion drives on looms.

Gates therefore engineered a clutch that is a marked improvement over the clutches previously available for looms.

Finally—and this was most important, too—the entire drive assembly had to be so designed that it would go on the loom without any

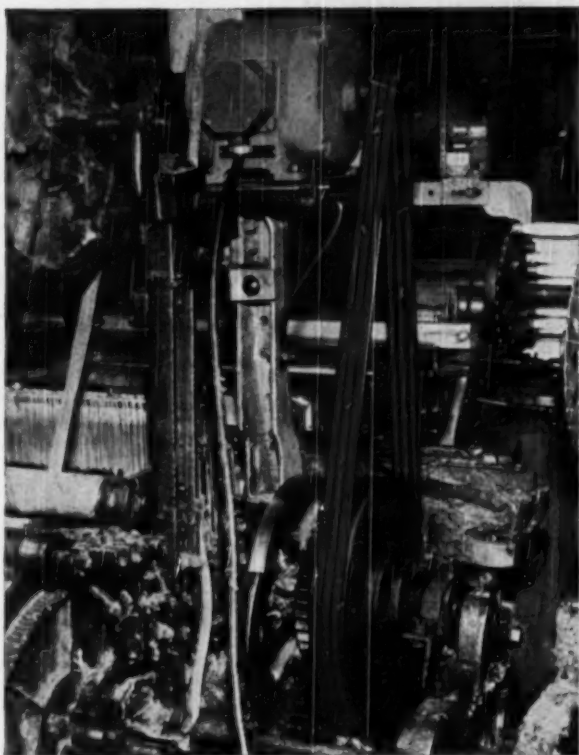
costly re-arrangement of existing mill equipment. This rather demanding job of design was also accomplished.

Today, the Gates V-Belt Drive for looms is cutting operating costs—and giving bigger loom output with better quality of cloth—in Cotton Mills and Rayon Mills the country over—another accomplishment of Gates SPECIALIZED Research!

ENG-501

THE GATES RUBBER COMPANY
The World's Largest Makers of V-Belts
DENVER, U.S.A.

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Branches
IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries





ROOF BOLTING TOOLS FOR COAL MINING

Roof Bolting in coal mines is now definitely established as a safe and economical operation as a result of government and private research and experiment. Complete information is available from the United States Bureau of Mines, which recommends for the operation the types of tools shown below. A request for a Thor Service Engineer will place this information, along with complete specifications on the tools, at your disposal. Write, wire, or call today. Independent Pneumatic Tool Co., Aurora, Ill.



STOPERS

Standard Thor Stoppers with Automatic Rotation are available in three sizes, from the popular 83 lb. machine (56" overall) to the heavy duty 116 lb. Stoper (58 3/4" overall), with standard or reverse feed.



45 LB. SINKER WITH SHORT LEG

New Thor development permits use of 45 lb. Sinker and rigid side-clamping device with special short-length air-feed to meet every coal mining requirement, even in shallowest veins. Write for details!



BOLT DRIVER

A non-rotating percussive tool, the 29 lb. Thor No. 18 Pin and Bolt Driver delivers abundant power for Roof Bolting.



IMPACT WRENCH

Thor Heavy Duty No. 20 Reversible Impact Wrench outperforms, out-wears anything in its class. Positive power transmission, large radius blow delivered closer to the work does the trick. Competitive demonstrations invited!



Thor

PORTABLE POWER
TOOLS

FOR MODERN MINES

Trucks get there

FASTER

at Lower Cost with... **EATON**

2-Speed Truck
AXLES

By combining pulling power and speed, Eaton 2-Speed Axles add to truck utility and permit faster trips, more pay-load miles—on the highway or off. Eaton Axles reduce stress and wear on engines and all power transmitting units. This means longer life and minimum maintenance cost...and Eaton's planetary design adds thousands of miles to axle life. Gear tooth loads are better distributed; gear speeds are slow; stress and wear are held to a minimum. Eaton Axles are available for most trucks of 1½ tons and larger. Ask your truck dealer for a road demonstration.



Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

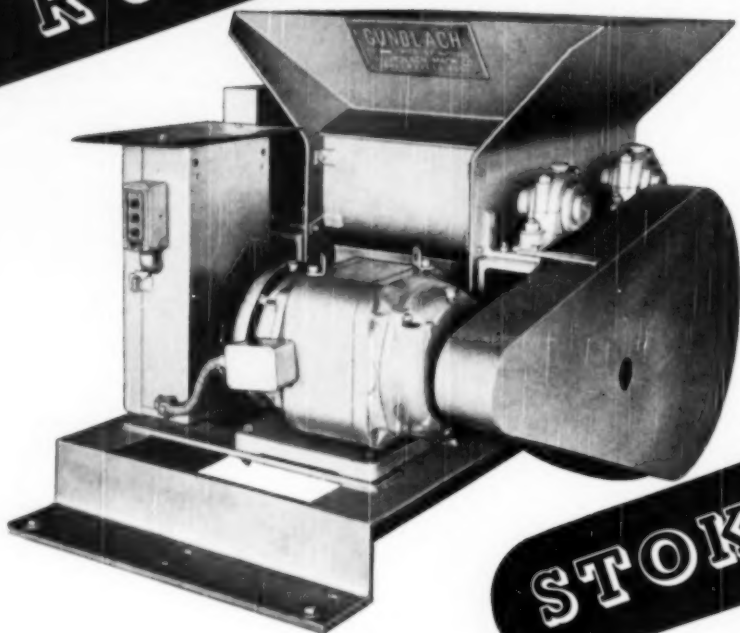


PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER DEFROSTER UNITS • SNAP RINGS • SPRING TITLES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

FROM MINE RUN TO STOKER COAL WITH "Two Stage" CRUSHING IN ONE MACHINE!

**MINE
RUN**

The GUNDLACH "Two Stage" Coal Crusher incorporates two crushing stages in one machine and is designed to reduce RUN-OF-MINE to STOKER COAL in ONE operation. Compact design simplifies structural supports and installation. Rugged simple construction combined with engineering proved in the field makes this machine a profitable and reliable unit.



STOKER

- Crushing rolls are STEEL, hard faced and balanced.
- All gears are steel cut; Timken roller bearings used throughout.
- Furnished with electric, gasoline or diesel power unit.
- Weight approximately two tons. Height 42" Width 47" Length 6'3" (Electric power unit)

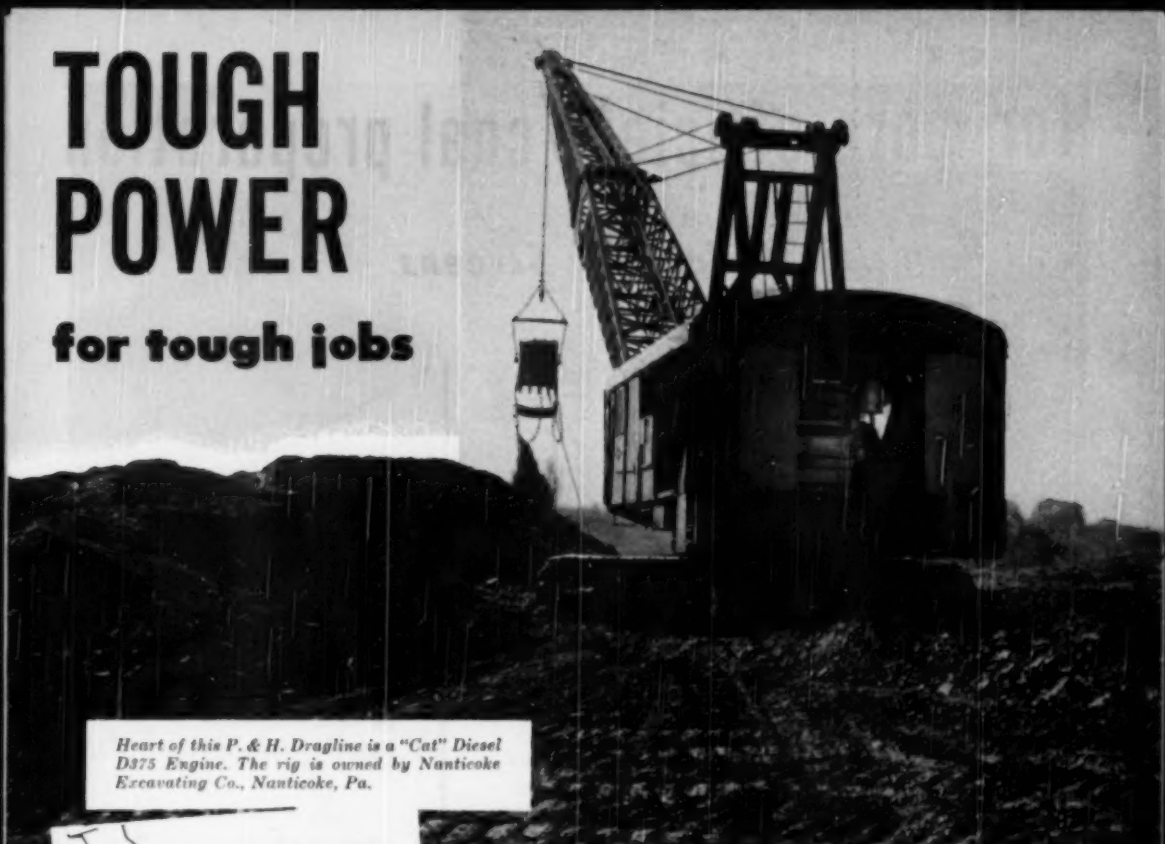
Fulfilling an urgent need in the industry, the GUNDLACH "Two Stage" Crusher has delivered over 85% usable stoker coal from an Illinois mine run lot.

WRITE TODAY FOR COMPLETE DETAILS AND CRUSHER BULLETIN GC-2.

T. J. GUNDLACH Machine Co., Belleville, Ill.

TOUGH POWER

for tough jobs



Heart of this P. & H. Dragline is a "Cat" Diesel D375 Engine. The rig is owned by Nanticoke Excavating Co., Nanticoke, Pa.



LOOK UNDER
THE HIDE

The advanced design of the "Caterpillar" fuel injection valve offers owners maximum simplicity. Machined to extremely close limits, these valves are made from the finest quality materials — and are subjected to very detailed hardening processes. Valves are completely interchangeable and are adjustment-free. A large single orifice minimizes fouling. With the matched design of valves and precombustion chambers, owners use low-cost, non-premium fuels to get top-notch economy. Look under the hide for quality. It doesn't show on the outside — it shows up in performance.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

When the Nanticoke Excavating Co. had this 3½-yard P. & H. Dragline repowered, a "Cat" Diesel D375 Engine got the nod. Why was it specified? Because of the company's *experience* with seven other "Caterpillar" units — three D8 Tractors, two D311 Engines, a D13000 Electric Set and a D17000 Engine. They were delivering superior performance. It stood to reason the D375 would follow suit. And it has!

Like all "Cat" Diesels, this D375 is tough. It has the lugging ability to crowd bigger bucketfuls. It provides steady power under changing loads. It's a sure starter any time, anywhere. And it has the guts to work day in and out with a minimum of down time. Result: increased production and greater profits for you.

It may pay you to repower *now*. But whether repowering or ordering new equipment, remember that *experience* proves "Cat" Diesels do a superior job in scores of different rigs. Your "Caterpillar" dealer is equipped to analyze your needs and make the installation. He's on the spot for service night and day. Get in touch with him — ask him to *show* you how profitably "Caterpillar" Engines can meet your requirements!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

for more efficient coal preparation

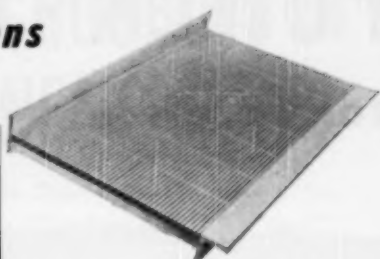
... *Hendrick Wedge-Slot Screens*

Plants installing new types of preparation facilities find these continuous slot screens unequaled for a wide range of applications. Some of their various uses include—

- For heavy media, wedge-slot screens are used as chute bottoms for dewatering and media recovery, for drum and wheel sections, and on vibrators.
- For jigs and other wash box types, wedge-slot screens are used for jig bottoms; and for dewatering and wet screening on shakers, vibrators, and stationary equipment such as chutes, conveyors and sludge drag bottoms.
- For separating cones, with or without sand, wedge-slot screens are used for recovery of sand and surplus moisture, and for dewatering and wet screening.
- For chloride washers, wedge-slot screens are used for circulating, drain and refuse boards, for drainage, recovery of chloride, and screening.
- Wedge-slot screens are also used to prepare the product for Dutch cyclones.

New wedge-slot types include screens with small bars to provide large open areas; with large bars for great resistance to abrasion; grizzly screens with extra large bars; and screens with parabolic head bars for heat drying and dewatering.

Special types of profile bars and assemblies have also been developed for such applications as water recovery, anti-stream pollution, filtering, froth flotation, thermal drying.



Any Hendrick representative in the coal fields will be glad to study your preparation problems and recommend the types of Wedge-Slot Screens that will best meet your particular requirements.

To serve its customers in the coal industry Hendrick maintains offices in—

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Perforated Metals
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July, 1950 • COAL AGE



Cut Truck-loading Time... Barber-Greene Cut Stock-piling Costs...

Here's an example of how a well-known gas company takes advantage of the pre-engineered versatility of Barber-Greene Portable Belt Conveyors. Several of these simple units are skillfully used to move coal from large-area stock piles to every loading station. Portable, they are easily adapted to changing conditions with a minimum of time and effort.

Literally, this is a "rapid change" conveying system. Conveyors may be quickly added or removed to meet different requirements—and aligned to carry materials

around corners and to every part of the storage area.

The simplicity and usefulness of Barber-Greene Portable Belt Conveyors are features you should investigate if any of your problems involve the movement of bulk materials. Shortened or lengthened by the addition or removal of sections, B-G Portable Belt Conveyors often eliminate the need for costlier permanent installations. To learn about them see your Barber-Greene representative. Barber-Greene Company, Aurora, Illinois.



BARBER • GREENE COMPANY AURORA, ILLINOIS

Constant flow Equipment



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PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



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FINISHERS



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Modern Mechanization

Rome Cable manufactures a complete line of cords and cables for mine use, each made for maximum service and economy. Compliance with Federal and Pennsylvania safety codes is indicated by "P-105 BM" molded in the Neoprene sheath.

Rome 60 Single Conductor Locomotive Gathering Cable—400 Volts
Strong adhesion between conductor and insulation, as well as between insulation and a tough Neoprene sheath, plus small diameter and extreme flexibility, makes this the ideal locomotive cable.

Rome 60 Parallel Duplex (Flat Twist) Mining Machine Cable—400 Volts
(with or without grounding conductor)

Here is the popular shuttle car cable of flat construction for compact reeling. Balanced adhesion between components combines ease of stripping for splices and firmness of outer sheath. Neoprene webs between insulated and grounding conductors provides extra protection . . . plus maximum resiliency to mechanical injury.

Rome 60 Concentric Mining Machine Cable—400 Volts

This is a two-conductor cable providing maximum flexibility and minimum diameter in a round construction. The second conductor is concentrically stranded around the insulated center conductor. Recommended for use on cutting machines and other off-track equipment.

Rome 60 Portable Power Cables—Two, Three and Four Conductor
Type W (Ungrounded) up to 3000 volts
Type G (Grounded) up to 2000 volts

This heavy duty portable power cable of multi-conductor construction is particularly recommended for use on electric shovels, loaders, mucking machines, or any equipment where delivery of a heavy power load is required. Conductors are assembled with rubber-like fillers providing maximum flexibility with a non-rotting, non-wicking inner construction . . . plus maximum resiliency to mechanical injury.

IT COSTS LESS TO BUY THE BEST

Requires Modern Cable . . .

Rome 60 MINING CABLES

NEOPRENE SHEATHED . . . MOLDED IN LEAD

Modern mechanization is a strong weapon in the battle against today's high mining costs. But, the productivity of mechanized equipment depends on the cable that delivers the power. It must provide uninterrupted service under the toughest conditions and resist abuse. It should, also, reflect modern engineering in its design. That is why more and more mine operators are switching to Rome 60.

Completely up to date, Rome's manufacturing, research and inspection facilities assure the dependable, uniform quality of Rome 60 mining cables. They can be depended upon for extreme flexibility, properly balanced adhesion between insulation and sheath . . . plus long-wearing Neoprene, molded in lead to a

tire-like toughness, for maximum resistance to acids, oils, abrasion, and flame.

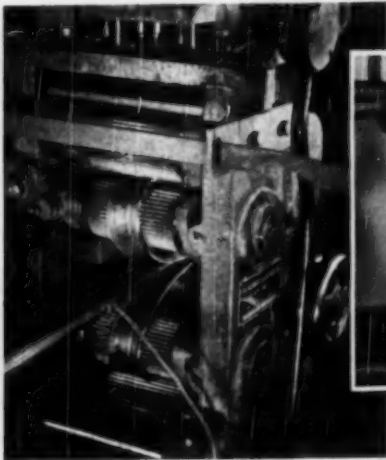
Progressive engineering has always kept Rome 60 mining cables out front. For example:

- Neoprene sheaths were utilized long before flame resistance was required by law.
- Adoption of heat-resistant insulation permits 75° C. continuous operation, providing higher current carrying capacities and overload protection.
- Inclusion of Neoprene webs between insulated and ground conductors in Parallel Duplex construction provides extra protection, without the use of fibrous components.

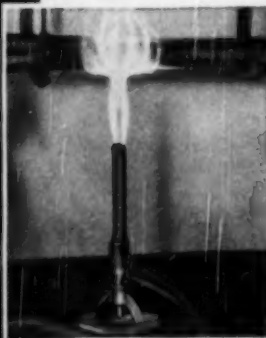
For your next mining cable requirement . . . specify Rome 60 and see for yourself.



Application of the Rome 60 Neoprene sheath is closely controlled.



Removal of lead mold produces a tough, wear-resistant sheath.



Notarized flame tests are well within permissible propagation.

See Rome at the
Bluefield Coal Show
August 16-19

ROME CABLE

Corporation

ROME • NEW YORK

From Bar to Finished Wire



Its Basic Principles Proved by Consistent Performance for Over 40 Years



For over 40 years Whaley Loaders have always been ready and dependable for low cost mining. For over 40 years the basic loading action principle, proved by performance records, has remained unchanged. Yet, constant improvements have kept our loaders ready to meet the ever increasing demand for greater production and lower cost.

Today, more than ever, no coal mine trying to reduce costs by mechanization can afford to overlook the dependable, consistent loading of the "Automat." No other machine can equal its versatility in service.

Its ability, well known by reputation, for staying on the job shift-after-shift, day-in and day-out, loading consistently, has probably sold more operators on the Whaley "Automat" than any other of its advantages. The logical reason for this endurance of the "Automat" is that it is designed simply and built with materials and parts so composed as to avoid costly breakdowns and repairs, holding maintenance to a minimum.

For today's mine operation, check up, by all means, on the consistent, low cost loading of the Whaley "Automat." Write today for our new Catalog 250 giving you the latest and most complete loading machine information ever published. Myers-Whaley Co., Knoxville, Tenn.



MYERS-WHALEY

"MECHANICAL LOADERS EXCLUSIVELY FOR OVER 40 YEARS"

Over sharp rocks—through slush, gravel,
mud and deep ruts... **GENERAL** moves
more tons out and over the highways
EASIER! FASTER! SAFER! CHEAPER!



**THE
GENERAL
L.C.M.**

For most work off the road

GENERAL L. C. M.—thick, tough, deep lugs resist cuts, bruises. Tremendous self-cleaning tread develops extra traction forward or backward.



**THE
GENERAL
H.C.T.**

For most work on the road

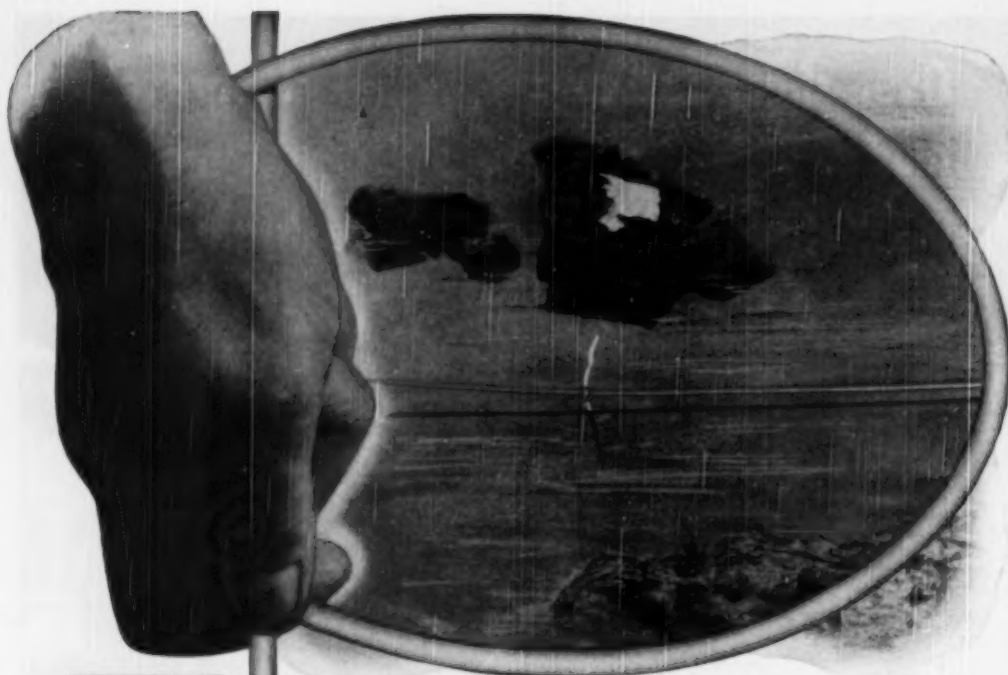
GENERAL H. C. T.—tough, broad tread wears longer, has more traction. Free-rolling tread ribs steer easier, stop quicker on the highway.

GENERAL UNDERGROUND MINING TIRE—wide, deep-lug tread develops extra traction forward or backward. Reinforced side walls resist cuts, scrapes and bruises. Thick, diagonal tread bars steer easier, grip faster, give more hours of productive work.

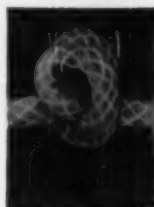


**THE
GENERAL
TRUCK TIRE**

**SPECIFY
GENERAL TIRES ON
YOUR NEW EQUIPMENT**



Plastic Reinforced Primacord is recommended for all "down" lines. Use Plain Primacord for surface or "ground" lines. To make the most effective hook-up, use a simple clove hitch in the ground line, as shown in these three photographs.



The twin loops have been folded over to form a hole.

Pass the Plastic Reinforced Primacord through this hole and draw the two ends up tight.



Tough going calls for

PLASTIC REINFORCED PRIMACORD

Surface water, sludge and mud need not delay your loading operations if you use the new Plastic Reinforced Primacord for the "down" lines. The seamless plastic cover is *water-proof* and resists penetration even at high pressures. It is also smooth, tough and resistant to the action of the acids commonly encountered. Sub-zero cold and high summer heat do not affect Plastic Reinforced Primacord. Its weight is about the same as Plain Primacord and its tensile strength is greater than that of Wire Countered Primacord.

Use Plastic Reinforced Primacord in deep, wet holes, in preloading, pipe line river crossing, horizontal holes, marine work, coyote tunnels and sleeper shots for seismograph work.

P-2

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JULY, 1950

IVAN A. GIVEN, EDITOR

New Mining Horizons

We need to get away from the old-type mine, put in more and better machinery, get more skillful men, put mining on an assembly-line basis. In the next five years the coal industry can make more progress in this direction than it has in the past 25 years if the industry has stability in its labor relations.—George H. Love, president, Pittsburgh Consolidation Coal Co.

We operators obviously need the very-best tools to work with. I think that the new competitive problems facing the coal industry demand the maximum use of modern equipment and materials which contribute to lower costs and higher quality. It is very important that each mine owner find the most-efficient operating methods. To this end, we all need to familiarize ourselves with the very-latest devices in machinery and technique that are available.—R. H. Sherwood, president, Central Indiana Coal Co.

WHAT ARE COAL'S PROSPECTS for achieving the 25 years of progress in the next five that recent events have made so vitally necessary? What are the new machines and new techniques that coal can employ in reaching these "New Mining Horizons"? No. 1, coal can do the job. No. 2, new equipment and new methods already are in existence or are being developed that will provide real help in attaining the desired goals of lower cost, higher quality and greater safety in coal production and preparation.

Progress such as this would mean reaching a productivity of well over 9 tons per man in bituminous mining by the end of 1955, and well over 4 tons in anthracite. In turn, on the basis of present-day wage rate, labor cost would be reduced 25% or

more by the end of 1955. In safety, it would mean cutting the 1949 fatality rate of 1.15 for bituminous to less than 0.35 per million tons in 1955, and reducing the anthracite rate of 2.18 to less than 0.75. In preparation, it would mean, in the bituminous industry, increasing the tonnage mechanically cleaned to 60% or more by the end of 1955.

None of these goals, to repeat, are impossible of attainment. In fact, some of them may be bettered. The answer lies in full and effective use of the equipment and methods presently available and reasonably to be expected in the future to achieve low cost, high quality and maximum safety. Help in planning for these "New Mining Horizons" is the reason for this special issue of *Coal Age*.



Blueprint for Progress

★ PRODUCTION ★ MANPOWER ★ PREPARATION ★ MARKETS

ATTAINING "New Mining Horizons" in coal is not solely a matter of raising tons per man, installing new preparation equipment and bearing down on safety. Neither is it a job for the management man or the production man alone, though both have critical and vital roles in the results.

Without adequate engineering

talent—on both the industry and equipment-manufacturing sides—the hazards of higher costs, inferior preparation and safety losses are enhanced.

Without supervisors and men who know their jobs and work at them, even the best in production, preparation and safety equipment will not yield the desired results.

Without research, sales and public-relations fully equal to the job, the gains made at the mines may be frittered away through failure to capitalize on them to the fullest extent possible.

Planning for maximum progress, therefore, must take in everything—and every man—from the mine to the consumer's firebox—and beyond in the legislative halls and the forums where public opinion is formed. Briefly, therefore, planning for coal's "New Mining Horizons" must include such steps as the following:

Mechanized Production

It is axiomatic that productivity in hand work is limited by man's susceptibility to fatigue, as well as his muscular strength. Therefore, to increase a man's output—and ease his work—the practice now is to supply him with a machine. For good and sufficient reasons, the coal industry has concentrated on machines at the face in recent years because it is in this area that major savings can be achieved through reducing or eliminating hand work.

With the equipment now available or being developed, complete mechanization of the face operation

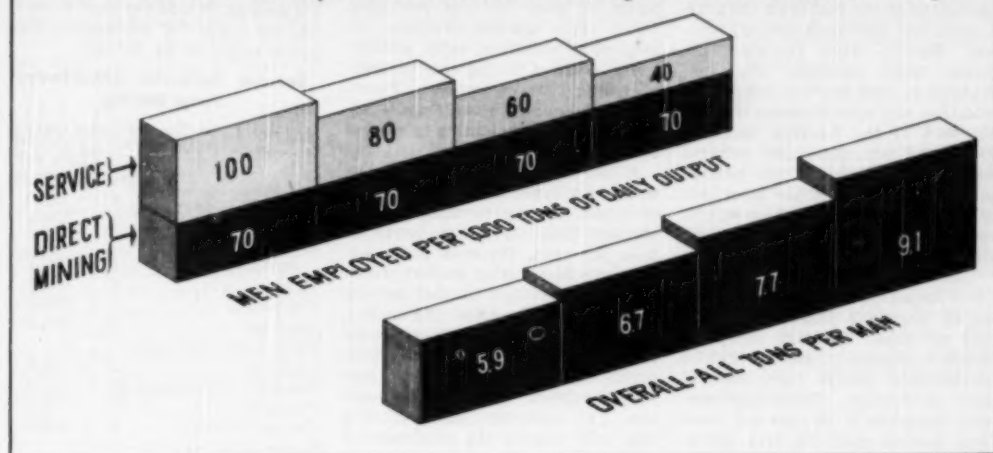
in the thicker flat seams is possible today, although it cannot be said that full mechanization has been achieved when, for example, it is necessary to stop the machine to timber, take down slate, and so on. In the thinner flat seams—less than, say, 30 or 36 in.—the problem is tougher and the progress consequently has been less. Aside from scrapers and certain specialized units, the self-loading conveyor is the major mechanical-mining unit now available for such thin seams. Increased emphasis on equipment for thin coal can be expected to

broaden the list in the future, however.

Pitch Suggestions—Because of natural difficulties, mechanization of pitch mining has lagged farthest. Even ideas for accomplishing the job still are somewhat scarce. There are, however, a few, and others may confidently be expected. Of the equipment now in existence, the standard drill and the big auger are suggested for pitch work. The former would be used either in drilling pillars to permit them to be shot out, or for drilling a pilot hole to facilitate widening to a normal place. The latter, or

SERVICE LABOR—KEY FACTOR IN COST

How Over-All Tons per Man Reflects Changes in Service Efficiency



big auger, it is envisioned, would do the complete job from the gangway with reasonable recovery.

To achieve the ultimate in cost reduction in this important phase of deep mining, therefore, the answer is the machine. Top management has, first, the responsibility of providing the best in mechanical equipment and in replacing it when new types demonstrate the necessary savings. Then, second, operating management—and men—have the responsibility of making that equipment produce at as near rated capacity as possible. Third, coal men and manufacturers together have the responsibility of developing auxiliary equipment and methods that will help in achieving as near 100% machine-operating time as possible. Only thus can the

full possibilities of mechanized face operation be realized.

Stripping Advantages—Is the deep-mine operator necessarily restricted to operating solely underground? And is it necessary to go underground as much as in the past? Because, among other things, of the higher capacity of mechanical units used in strip mining, and because less service labor is needed as compared to operating underground, stripping has a definite cost advantage which it probably will continue to hold for some time. Therefore, since the goal should be lowest-possible cost, rather than adherence to one type of mining or the other, the deep-mine operator should plan on stripping as a supplement wherever possible. In addition,

past limits on stripping depth should be inspected with care in view of the improvements in stripping equipment which extend both unit capacity and range.

Conversely, standard mining units and, more particularly, such new units as the continuous miner and the big auger promise considerable benefits as stripping adjuncts. With either of these units, it is possible to extend the limit of strip mining by going underground from the last cut. A fair additional recovery can be achieved without too much increase in cost through additional service labor. In some instances, it can be attained with little or no increase, provided the underground distance is kept within limits, thus preserving part or all of the stripping margin.

Mechanized Methods

In deep mining, practically all loading equipment to date has been designed for the conventional room-and-pillar system—for the good reason that room-and-pillar materially eases the problem of controlling subsidence and caving of the top, easing the mining problem.

Good though room-and-pillar is—and it is good enough to last a long time yet—it has the big disadvantage, with conventional equipment, that time must be lost in shifting the units or in repeating the cycle. The logical answer is more tons per

place to increase the loading opportunity. One way of achieving more tons per place is operating with long walls. Another is taking advantage of natural conditions, or of some of the newer mining aids, such as roof bolting, to increase the width of the place. A third is increasing the depth of the cut.

Possibilities in Working-Section Layout—With the new continuous-type machines, the problem of moving or preparing to repeat the cycle is practically eliminated. This

—at least for the present and for certain types of machines—favors the continuance of room-and-pillar, though with others the feeling is that semi-longwall may permit a substantial increase in machine output. Even with room-and-pillar, it may be advantageous to look into the subject of pillar size since, for example, by reducing thickness, it is possible, with at least one design of miner, to remove the pillar without timber.

Working-section layout, in addition to general mine layout, therefore should receive careful study by both operating men and engineers.

NEW MINING HORIZONS—Blueprint for Progress

Efficient Service

Service as used here means all operations on the coal from the time it goes into the main-haulage system. Service labor therefore includes main haulage, drainage, ventilation, rock dusting, track construction and maintenance, timbering back of the working sections, power and communication, general maintenance, preparation, general outside clerical and other labor, supervision, and so on, in deep mines, and corresponding operations in strip mines.

The reason why efficiency in service is important is because it ultimately fixes the limit on over-all tons per man. To make the point simple to absurdity, assume that 50 service men handle 1,000 tons of daily production. Their performance therefore is 20 tons per man. Now assume that the face operations are so efficient that only one man is needed to produce this 1,000 tons and start it on its way. Total men required therefore becomes 51, and over-all tons per man 19.6.

Once a mine is developed, service labor as a general rule varies only nominally with the thickness of the seam. In other words, for a given daily output, the number of service men, assuming similar mining and preparation equipment, will be little different whether the coal is 3 ft or 6 ft thick.

The Service Situation—What is the present picture in service labor? A late study indicates that over a major section of the bituminous industry, tons per man for service labor is approximately 18 for both mobile- and hand-loading mines. On the other hand, reflecting the advantages of machine loading, tons per man for direct mining labor is approximately 14 for mobile-loading mines and 7 for hand-loading mines. Consequently, the mobile-loading mines show an over-all tons per man of around 8, compared to 5 for hand loading.

In contrast to the deep-mine figures, the picture in stripping shows a productivity of over 30 tons for service labor, nearly 50 tons for di-

rect mining labor and an over-all figure of over 19 tons per man. Thus, strip mining reverses the deep-mine situation, with productivity in direct mining substantially exceeding that in service. Therefore, strip mining has a definite advantage over deep mining in normal overburden.

Since, in deep mining, as the figures previously cited show, face or direct mining normally is less efficient than service in terms of tons per man, there is good reason for concentrating on that phase. But since the fact is that service labor ultimately fixes the ceiling for the operation, service should receive equally intense study from engineers, operating men and manufacturers. Three of the goals are: (1) equipment and facilities that will require the minimum of maintenance; (2) maximum use of high-capacity equipment; and (3) maximum use of automatic controls.

Productivity Possibilities—Pending development of radically new and as yet possibly unthought-of equipment and methods, consideration of the service-labor situation leads to the conclusion that the present ultimate is around 25 tons per man over-all in bituminous deep mines with thick coal and good conditions. For mines in coal less than 30 or 36 in, 10 to 12 tons per man is considered to be about the maximum with face equipment presently available.

Because of the reduced opportunities for raising efficiency at the face, service labor becomes an even more important factor to thin-coal mines. For example, if 70 face men are producing 1,000 tons, over-all productivity with various levels of efficiency in service is: 100 service men (170 total), 5.9 tons per man; 80 service men, 6.7 tons per man; 60 service men, 7.7 tons per man; 40 service men, 9.1 tons per man. On the basis of a daily wage of \$16.60, the difference in labor cost with 100 and 60 service men is 65¢ per ton.

Service Yardsticks—Practical yardsticks by which to measure the efficiency of service operations naturally are difficult to set. But with the goal as 20 tons per man in service, the bogey for bituminous deep mines might be as follows:

Service Yardstick Bituminous Deep Mining

Men per 1,000 Tons of Daily Output

	Men	Tons per Man-Shift
Haulage	8	125.0
Drainage	2	500.0
Ventilation and rock dusting	2	500.0
Track	4	250.0
Timbering	3	333.3
Supplies	2	500.0
Power and communication	2	100.0
General maintenance	10	100.0
Preparation	10	100.0
General outside	5	200.0
Supervision and clerical	2	500.0
Total	50	20.0

For 33.3 tons per man in bituminous stripping service, the standards might approximate these:

Service Yardstick Bituminous Stripping

Men per 1,000 Tons of Daily Output

	Men	Tons per Man-Shift
Haulage	4	250.0
Drainage	1	1,000.0
Roads	1	1,000.0
Supplies	1	1,000.0
Power and communication	1	1,000.0
General maintenance	6	166.7
Preparation	10	100.0
General plant labor	4	250.0
Supervision and clerical	2	500.0
Total	30	33.3

To sum up, careful study of service operations is a necessity for at least two reasons:

1. Because service labor ultimately limits tons per man.
2. Improvements in service efficiency, unless a high level already has been attained, offer the possibility of a major cost reduction.

Mechanized Preparation

Along with cost, quality has become an even more important factor in industry progress as a result of the increased pressure of competitive fuels and the growing im-

portance of the industrial market, among others. The answer, with exceptions where natural quality and uniformity are high, is mechanical preparation.

A major problem of the future is preparing the extreme fines. In varying degrees, this problem will become more and more important to all operations, in turn bringing in the questions of cleaning efficiency, dewatering and screening—and its cost.

Other questions involved in planning for preparation for the future are whether or not to go to full-seam mining and how to engineer the plant to keep both operating labor and maintenance to a minimum. Where continuous miners are employed, mining automatically

becomes full-seam, and the fines problem normally is increased. With conventional equipment, there still is a choice, although the trend is toward taking everything at the face and designing the service facilities, including the preparation plant, to handle the extra refuse

because, normally, it is cheaper that way. And if full advantage is taken of modern automatic controls and modern materials to reduce maintenance, replacement of an old-style plant with a modern one also can effect an actual labor saving in many instances.

Efficiency-Minded Men

Men who know their jobs and how best to handle them mean more than the equipment and methods employed. In planning for higher efficiency, quality and safety in the future, therefore, coal should take the following steps:

1. Provide adequate, qualified engineering talent by intensifying recruiting and training programs already in existence.

2. Make fullest use of consulting organizations and of the engineering and application departments of manufacturers.

3. Provide training for both supervisors and miners as necessary.

4. Promote, by every possible means, cooperation between miners and management to reduce friction and work stoppages, and insure maximum mining, preparation and

safety results for future progress.

That these and other efforts pay off is illustrated by a recent report that explaining the meaning of high ash to cutters resulted in their taking extra care in operation, thus reducing the mine-run content over 1%. Other reports of reductions in machine breakdowns and maintenance, in reduced supply waste and in other directions provide additional confirmation of the value of working for better employer-employee relations.

Safety-Minded Men

The fact that major progress has been made in recent years in reducing injuries and fatalities in coal mining is no indication that the possibilities are pretty well exhausted. New types of mining

equipment materially reduce some hazards but intensify others. Coal dust and gas still will explode and roof and ribs will continue to fall if the proper precautions are not taken.

New methods and new equipment, such as the roof bolt or pin, promise very real additional help in safety, and mine and operating layout should be adapted to take full advantage of these possibilities, many of which also promise substantial production economies and consequently a lower cost.

Research to Build Markets

The ultimate test in producing and distributing any product is the extent to which the consumer profits from its use. Cost and quality are important elements, but equally important is efficiency and

satisfaction in actual service in the consumer's plant.

Research can and has improved utilization efficiency. In addition it can and has opened up new markets. But there is much to be done

yet. A part of coal's planning for the future, therefore, should be increased support of research to expand market opportunities through the development of better burning methods and better burning equipment, and through bringing to commercial reality other and new outlets for coal.

Effective Merchandising

Better mouse traps are not bought. Time has proved that they, like any other product, must be sold. Good merchandising, therefore, must back up low cost, high quality and research.

Since the goal is to move the

product in the maximum volume and at the best price possible, merchandising in its broadest sense goes beyond advertising and normal solicitation by salesmen. As an example, coal might very well consider going into equipment de-

sign, manufacture, sales and service to promote the use of its product. Certainly, it should be prepared to support those endeavoring to expand the use of coal-burning equipment, and certainly also, it should be prepared to render any service necessary to insure satisfaction in use, thus building goodwill for coal as a fuel.

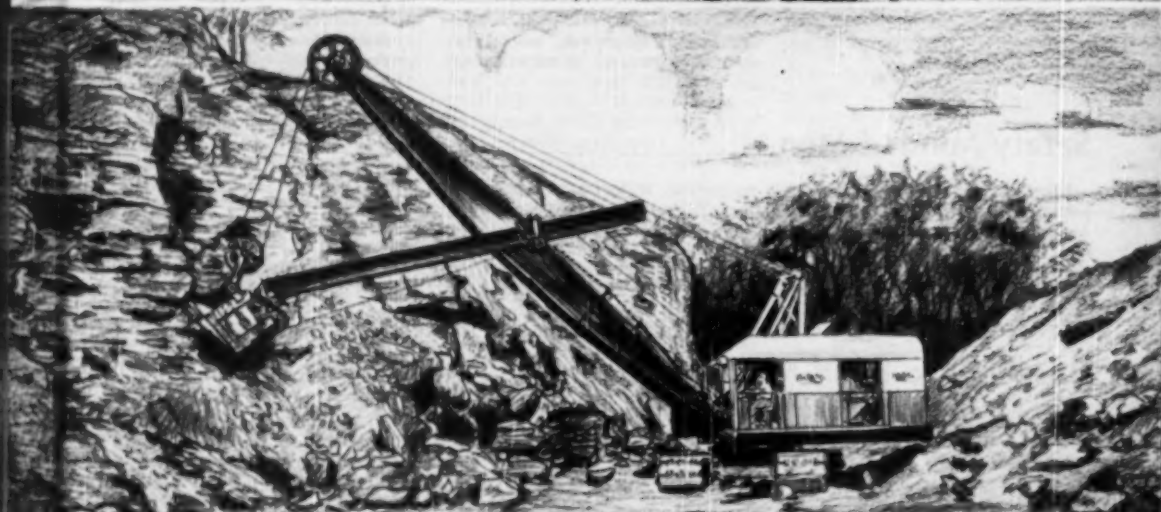
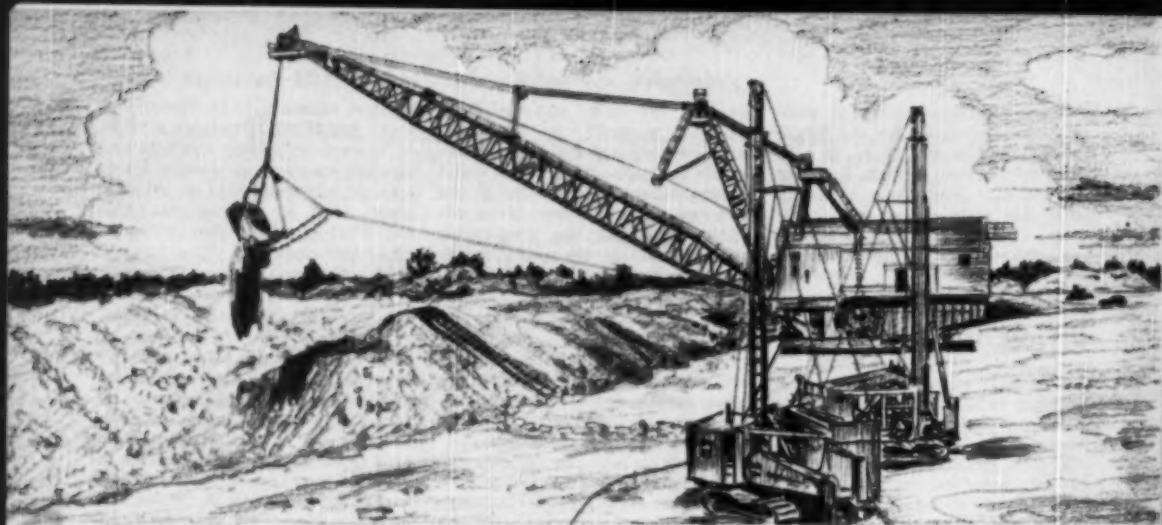
Building Goodwill

Friendly people are a major industry asset. This is true of coal as well as all other businesses and has led to the public-relations programs now functioning to build goodwill for coal mining by backing up progress in all other phases

of production and distribution in the industry.

For the future, in addition to continued support and expansion of industry-wide programs, the trend is toward more and more local and individual action. The goal of these

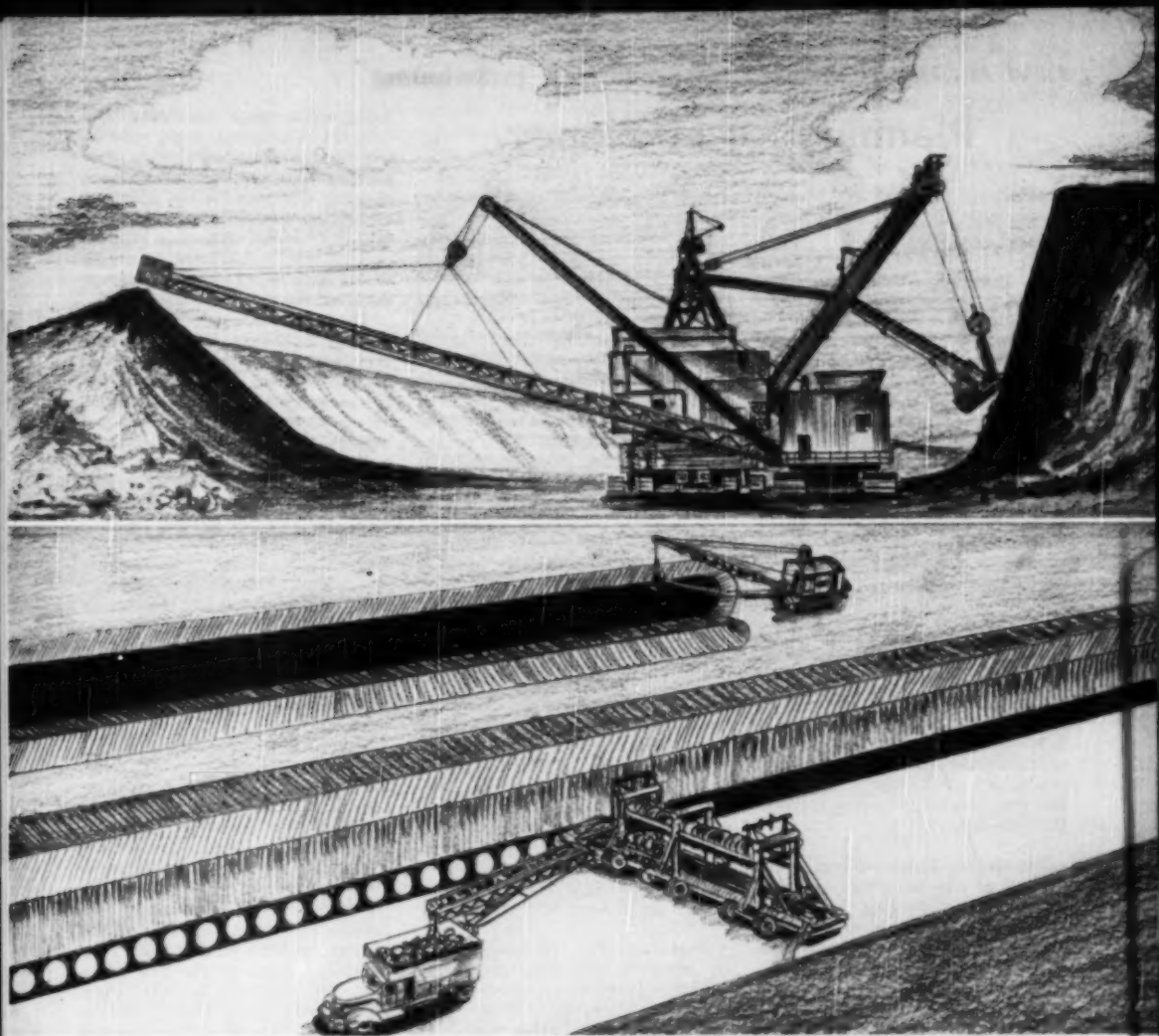
grassroots drives is promotion of better employee and community relationships through making more of the facts about coal, its problems and its progress available to more people more often. Because of the importance of public and employee goodwill, its stimulation becomes a major plank in planning for coal's "New Mining Horizons."



TODAY Added power and higher capacity meet the problems of achieving lower cost in thicker overburden in strip pits now in production.

Opportunities in Stripping

- ★ Tested Methods for Increasing Stripping Efficiency and Cutting Cost With Equipment Presently Available
- ★ New Machines and New Methods for Further Strip-Mining Progress Through Better Operation in the Future



TOMORROW

New stripping units with added range and new auxiliary equipment and methods promise further cost reduction in the future.

STRIP MINING now accounts for well over 20% of the coal production of the United States, reflecting the economies in manpower made possible by a high degree of mechanization. Aside from the higher-capacity equipment available per man, strip mining, as pointed out in the preceding feature in this issue, requires substantially less service labor than deep mining. Thus, the conclusion is that stripping should supplement deep mining wherever conditions make it possible. Contrariwise, stripping might well be supplemented by deep mining to extend recovery at a reasonable cost when overburden depth exceeds the maximum that

equipment in service can handle.

Coal stripping is materials-handling in one of its most advanced forms—a form making the maximum use of machinery. The higher investment cost, therefore, makes it even more important that this equipment be given the best possible opportunity to work at or close to capacity for most efficient use of manpower and lowest cost. Since the manpower and investment is the same in both instances, operation at, say, 95% of capacity rather than 80% means a substantial reduction in over-all operating cost.

Use of larger equipment, such as a truck, is a second major means of conserving manpower. The invest-

ment in, for example, four haulage units instead of eight normally is no more and usually is somewhat less, while the wage bill is halved. In addition, maintenance and other costs—garage space, for example—are reduced.

The opportunities for cutting cost in stripping summarized in the succeeding pages, therefore, fall into two general classes:

1. Increasing operating time per stripping and loading unit, involving advance planning and efficient conduct of drainage, overburden preparation, haulage, maintenance and other activities.

2. Use of large equipment, thereby reducing labor and other costs.

Planning for Efficiency

Attaining low cost in stripping starts with the plan for development of the property. This in turn takes in location of the box cut or cuts, planning the sequence and length of the succeeding stripping cuts, providing for outside curves and spoil-disposal areas in deeper overburden, laying out haulage roads, providing proper drainage, locating pole lines, and so on.

The old reliable for subsurface work to establish overburden thickness, coal thickness, nature of the rock and changes in grades in the coal seam is the prospecting drill. Carefully planned drilling, therefore, should be the first step in opening a stripping property.

Aerial Surveying—Conventional surveying methods may be employed to obtain the necessary data on surface conditions. Aerial surveying, however, is a new method providing real economies in two directions:

1. For reconnaissance, aerial mapping can deliver detailed photo mosaics of the entire area at a cost of 4 to 6¢ per acre. The result is swift, low-cost exploration, narrowing contour-mapping work to the sections where development is planned. Moreover, with the photos, outcrop and benching can be studied stereoscopically.

2. For development planning, aerial surveying delivers reliable

topographic maps providing real help in estimating coal acreage, plotting bore holes, computing overburden, plotting property lines, plotting workings for tax purposes, evaluating timber resources, locating spoil dumps, planning redevelopment and reclamation, and providing data required by government agencies for future operations.

The time required for aerial mapping is less than half the plane-table time. Cost may be as low as 50¢ per acre, as in a recent contract for mapping with a contour interval of 20 ft at a scale of 1 in per 400 ft. On another survey, the aerial cost was reported at \$1.84 per acre for 7,200 acres, 5-ft contours, 1 in per 100 ft, compared to \$2.92 per acre for ground methods on similar terrain at another property.

Low-Cost Drainage

Water, like taxes, is always with a strip-mining property. Not only is it a cost item in its own right, it also influences the performance of production men and equipment. Efficient handling is compounded of the following:

Preventing Inflow—Keeping water out of the pit involves one or more of the following: (1) dams and diversion channels or pumps to cut off streams, (2) ditches on the highwall ahead of the pit, (3) flumes over pits.

Gravity Handling—The most economical method of removing water is by gravity. If the grades

favor it, keeping one end of the pit open for drainage is one method. Drainways at intervals through the spoil is another. A third is pipes, flumes or culverts from low spots through the spoil. Sewer tile, cull concrete pipe or box or crib culverts may be employed for this purpose, in addition to corrugated-metal or regular pipe laid as the coal is loaded out of each cut.

Pumping—The portable pump on wheels is the mainstay where drainage requires pumping equipment. Such portable units normally are supplemented, where the water problem is of sufficient magnitude, by larger main pumping stations.

Here, automatic controls conserve pumping labor. For low maintenance, pit pumps should be equipped with weatherproof motors and controls.

The hose is now being supplemented by quick-coupling pipe, which provides much the same results in flexibility and reduction of labor. Where hoses are used, the new plastics reportedly provide the advantage of greater resistance to abrasion and rot, with corresponding increase in life. Aluminum is a popular new pipe material because its light weight permits fast, easy handling. Some of the new couplings are designed to open when the pressure drops, thus providing automatic draining of the pipe and reducing cold-weather trouble that may occur.

Overburden Preparation

While increased power and improved design have increased the ability of stripping equipment to dig overburden without shooting, normally the best practice is to break it up first. One reason, of course, is that loose material can be handled at a faster rate. A second is that maintenance on stripping equipment is reduced.

The answer to the problem at any particular operation involves trained men, good equipment, constant study of conditions, and a willingness to change methods, breaking mediums and equipment any time such a change is indicated.

Drilling Equipment—Where the character of the overburden is right, the horizontal auger is by far the most efficient and cheapest unit. For maximum capacity and lowest labor cost per foot of hole, power auger feed and withdrawal are essential.

Although the horizontal drill still is widely used, a definite trend to vertical drilling has developed in late years as a result of improvements in drill design, increases in power and changes in the nature of the overburden. The reasons include: (1) more opportunity, in some types of overburden, for get-

ting a better distribution of the explosive, (2) more opportunity for getting explosive into hard layers high in the bank though, as an alternative, some operators have gone to two-level horizontal equipment, and (3) reduced drilling footage where cap rock or other hard layers must be broken.

Auger and rotary-type equipment has moved much farther into the foreground for vertical drilling. At the same time, better design and increased power have been reflected in ability to drill holes up to 9 to 10 in or more in the case of some of the new auger units. Increased speed reflects both increased power and better bits. The alloy and carbide-insert bits early proved their

ability to increase footage as much as 50% or more in horizontal and vertical drilling. Similar results were obtained with oilwell-type rotary bits operating wet. Now, a dry-type oilwell bit promises equal footage without water.

Though the new drills make bigger holes feasible and economical, footage per hour reflects the total material that must be cut to make the hole. Consequently, a definite trend to smaller holes is reported. The result is faster drilling and reduced drill maintenance.

Where extremely hard sandstone is encountered, a possible added starter is the flame drill. Preliminary experiments in iron indicates good possibilities in burning holes through very hard material.

Shooting Practice—The goal in shooting overburden naturally is to accomplish the maximum in break-

ing with the minimum in explosive. For most conditions, standard patterns, adjusted after study and varied as necessary to meet conditions, achieve maximum efficiency. What might be termed special conditions require special patterns and special handling of the charges. Examples include: two-level holes, combination horizontal and upward-angling holes drilled from the same level, combination vertical and horizontal drilling, and splitting of charges in both horizontal and vertical holes to get breaking force at the points it is most needed.

In firing, the use of milli-second delays or detonating cable has come far to the front in recent years. One reason is reduction of shock and earth vibration which might affect neighboring buildings. A second is the fact that considerable relieving can be done by shooting in sequence, thus making it possi-

ble to get better fragmentation with a minimum of explosive.

Spoiling by Shooting—Under the right conditions in contour or hillside stripping, it is possible to move considerable overburden by shooting it over the hill or into the next cut. Some extra drilling may be required but normally the job is merely one of increasing charge per hole. While the explosive cost is increased, man and equipment time is saved in even greater proportion.

Machine Stemming—At least one machine has been developed to stem long horizontal holes by power. A ram places and tamps the charge. Thus, it is possible for one or not more than two men to charge and load holes in a fraction of the time required with hand charging and stemming.

Stripping and Loading

STRIPPING TODAY

How efficiently the overburden is moved after it has been prepared is perhaps the major ingredient in final stripping cost. This in turn is a function of the capacity of the stripping equipment and how it is used. Today's tested methods for achieving maximum cost reduction include the following:

High-Capacity Shovels and Draglines—Within reasonable limits, expenditures for additional capacity in stripping normally mean an even greater reduction in labor and other costs. As a result of increased power, better design and progress in the development of lightweight high-strength alloys for dippers, buckets, shovel and dragline fronts, etc., 50-yd dippers and 85-yd buckets are in operation today.

The big, lightweight dipper or bucket also has proved its worth in cutting cost or permitting the handling of thicker overburden on equipment already on the job. Increases in capacity up to 50% have been attained with no increase in the total weight of dipper and load. A further step now being tried is perforating both dippers and buckets to achieve an even greater weight reduction and increase in capacity.

In the field of smaller equipment—and for the same reasons—shov-

els up to 5 to 7 yd are now able to handle and spoil overburden up to 50 ft or more in thickness, largely because of booms and sticks that materially increase digging and spoiling range and new engines providing the necessary power.

The characteristics of the shovel are such, however, that range can not be increased beyond reasonable limits without a major increase in cost. For that reason, and because of increasing thickness of overburden, the dragline has been moving more to the front. To increase flexibility where there are major variations in overburden thickness, adjustable-angle booms are a new advance. With a flat angle, thus increasing the reach, and a correspondingly smaller dipper, the unit can dig and handle a greater thickness of material.

High-Capacity Scrapers and Bulldozers—As with shovels and draglines, the power and capacity of scrapers and tractors has been increasing, thus permitting them to handle a wider range of jobs at the same or a lower cost per yard. This accounts for the steady rise in the use of scrapers and bulldozers as actual stripping units. Dozer developments include twin tractors coupled side by side with giant-sized blade. In other instances, two tractors work blade to blade.

Some designers, in fact, foresee development of the tractor to the

point where, considering relative investment cost, it will be nearly or as cheap to push or scrape overburden as to move it with a shovel or dragline. And the scraper or bulldozer is less tied to a definite maximum in overburden thickness and in spoiling distance. Also, less leveling is required where leveling is necessary.

As an example of bulldozer work, two units, it is reported, strip up to 65 ft at one operation recovering a 4-ft seam. Most of the overburden is shot and the two tractors, plus a shovel ripping slate off the coal, average 1,100 tons per day. The hourly cost for tractor lubrication is 6.8c; diesel fuel, \$1.12.

An even more frequent use of dozers is pushing shovel spoil. In one instance, a dozer unit pushes 10 to 12 yd approximately 100 yd and returns in approximately 1 min. A 2-yd shovel digs the spoil.

Aside from earth-moving proper, the tractor and bulldozer is a handy unit in facilitating cleanup behind, stripping shovels, thus permitting the shovels to concentrate on the main job. The increased speed of the newer rubber-tired units facilitates their use in this respect.

Tandem Operation—An old and proven method of handling thicker overburden is tandem operation—usually a dragline in combination with a shovel. Less frequent applications are two draglines in tandem or two shovels in tandem. With two shovels in tandem, maximum use is made of the range of

NEW MINING HORIZONS—Opportunities in Stripping

each, the outside unit dumping as far over as possible and the inside unit spoiling between the edge of the coal and the previous row.

Two-Pass Stripping—Specialized methods of using single stripping units to handle thicker overburden include two-pass shovel stripping. In such stripping, the shovel first works on a bench up to 10 ft or more above the level of the top of the seam. Upon completion of the first pass, it digs down and removes the bench.

Auxiliary Excavators—A widely used method of stripping where overburden thickness is beyond the range of the shovel is installing separate equipment to remove and spoil the soft top layer. Standard equipment employed in such work includes small draglines and tractor-powered scrapers. A new unit is the wheel excavator, which has the advantage of more continuous operation and a higher capacity.

Spoil Haulage—With improvements in trucks and other automotive transportation equipment, spoil haulage is becoming an increasingly important factor in stripping. In fact, the deep-basin and other strippings in anthracite are possible only because of spoil haulage. Haulage also is being increasingly called upon in bituminous stripping not only to solve the problem of deeper overburden but also to reduce supplementary leveling work.

New units for spoil haulage have level-full capacities of as high as 40 cu yd, operate at high speeds and dump without stopping.

STRIPPING TOMORROW

Fundamentally, progress in stripping in the future, particularly in size of equipment and depth of overburden handled, will reflect ability to stay appreciably under deep-mining costs. With present equipment and overburden limits, this is relatively easy. More significantly, the spread is such that considerable leeway still exists for the development of higher-capacity equipment or the introduction of new units for stripping or auxiliary service. The directions in which progress already is taking place or may be expected include the following:

Bigger Equipment—Though exploration of the possibilities is

now under way, the date when the 60-yd shovel or the 50-yd dragline may be expected is still a matter of speculation. Cost is one of the factors. Achieving the necessary increase in operating voltage is another. However, since it still is hard to beat a shovel or dragline in moving earth, many stripping authorities believe that future developments will continue to stress improving shovels and draglines and increasing their capacity. At the same time, for the reasons previously cited, increased emphasis will be laid on the improvement and extended use of such other earth-movers as scrapers and bulldozers.

Stacker Operation—The stacker has long been considered a major answer to the problem of getting spoil farther away and piling it higher, thus increasing the range of the standard shovel or permitting the use of a smaller, less-expensive unit. The problem is getting the material small enough to be handled on a belt or in a car. With improvements in crushing equipment, it is now considered feasible to design a portable plant that can receive, crush and stack behind shovels as large as 60 yd.

Spoil Haulage—A second method of getting spoil away from stripping equipment is hauling or pushing it. As previously indicated, trucks, side-dump rock wagons and bulldozers are being increasingly used for this purpose. A logical development, some authorities point out, is a rubber-tired train comprising a pulling unit and up to three or more rock wagons or cars with capacities up to 60 yd or more.

Combination Operation—All signs indicate a major increase in combination operations in the future. Now, the continuous miner and the big auger are available to supplement conventional loading and conveying equipment for extending the range of stripping when overburden becomes too thick.

The limit is, of course, a complete shift from stripping to deep mining, meaning taking on the burden of all the extra service costs involved in deep mining. By limiting the distance, however, and using either conventional deep-mining equipment or the new continuous miners or augers, it is possible to keep service labor down.

With the auger, for example, it is possible to go in, at present, around 120 ft. New cutting barrels and

wedging equipment permit a high yield of coarse sizes. Productivity also is high. In one instance, in thicker coal permitting the use of larger equipment, four men produce as high as 1,000 tons per shift. At another operation, using a 24-in auger in thinner coal, productivity is reported as 25 tons per man per shift. Coal recovery, according to reports, run as high as 80 to 85% in thicker coal where two rows of holes can be drilled in the top and bottom, with top and bottom holes staggered to reduce the rib.

Suggestions for combination operation also include box-cutting at intervals of, say, 200 ft or more and removing the intervening coal by augering or use of conventional deep-mining equipment, thus materially reducing the quantity of overburden that must be moved.

Stripping Without Shooting—Whether a stripping machine can be developed that will dig hard rock without shooting still is a matter of speculation. Practically all types of equipment present in service will dig soft material, and new units are being designed for this same service. Hard rock, however, is a different problem. But with advances in metallurgy and with sufficient power, development of stripping equipment that will do its own digging in practically any type of material is not considered an impossibility, and might come in the relatively near future.

LOADING

The shovel, including the small-tractor-mounted types, still is the leading loading instrument in strip mining. Where the coal must be broken prior to the loading operation, the vertical auger drill is the most popular medium because of speed and mobility. Where the coal is relatively thin and lump is the prime consideration, pinning machines have staged a major growth in recent years. And to reduce loss of coal by providing a smooth, solid edge along the berm, interest in slotting or trenching has increased. For such slotting or trenching, a new unit is the ditching machine modified for strip work.

While the shovel undoubtedly will continue to be the principal loading unit in strip mining, partly because, in the smaller operations, it also can be used for stripping, the continuous mining machine has generated interest as a possible loader, particularly since it would eliminate drilling and shooting.

Low-Cost Transportation

As in deep mining, haulage normally constitutes the largest single item in service. An obvious answer is reducing haulage labor by increasing the size of the equipment. The fact that this can be done is evidenced by the successful use over a period of years of semi-trailer units with capacities as high as 75 to 80 tons and straight trucks up to 30 tons or more.

Heavy equipment naturally requires better roads and better road maintenance, as well as minimum grades. Consequently, there are limits on the size of equipment at many contour and hillside operations. Within those limits, how-

ever, every attempt should be made to use the largest possible equipment, not only because of savings in operating labor but also in maintenance and cost of shop, garage and other facilities.

Roads—The advantages of capacity are reduced if operation at rated speed is impossible. Therefore, efficient strip haulage demands roads that will permit such operation. The keys are:

1. A compact, firm subgrade of good materials.
2. Good drainage to keep the subgrade dry.
3. Sufficient width for safe pass-

ing without stops or speed reduction.

4. A solid, strong foundation of stable materials under the running surface.

5. A dustproof and waterproof running surface.

6. Minimum grades—less than 1 or 1½% where possible.

7. Regular maintenance and repair.

Combination Haulage—Where distances from the pit to the preparation plant are long, a number of operators have found it pays to gather to a field transfer station with automotive equipment and then haul to the plant by rail, using steam, electric or diesel locomotives. A second possibility is overland belts from the field stations.

Power and Communication

Maximum continuity of service, stable voltage and safety to men are the major items in electrical supply to stripping equipment. Steps to that end include the following:

1. Keeping substations close. This has been facilitated by increasing adoption of the new semi-portable substations which include three-phase transformers and the necessary control and protective equipment.

2. Good lightning protection.

3. Capacitors to correct power factor.

4. Voltage-regulating equipment.

5. Safety ground facilities. For 4,000-volt service, the neutral ground resistor is considered the best answer. For 440-volt service, it is the derived neutral.

6. Good switch and junction-box equipment.

7. Special facilities, such as cable pullers and cable trucks, for conserving manpower and reducing

time required in making changes.

Higher Voltages—Increasing horsepower and heavier peaks has made voltage regulation more difficult and has required more care in keeping substations close. The prospect of even higher horsepower in units to come in the future, combined with the problems of today, has focused increased attention on the possibility of going to 6,900 or 13,800 volts, which would materially increase transmission distance between moves while providing more stable voltage conditions. Cost of equipment for the higher-voltage service is higher but not appreciably so.

Engine Power—Improvements in the design and capacity of internal-combustion engines will, it is forecast, permit greatly expanded use in shovel and dragline equipment up to 8 to 10 cu yd, as well as in heavier trucks, scrapers, bull-

dozers, and other specialized units.

Radio Communication—Although the pioneer installation is only a few years old, the advantages of frequency-modulation radio in stripping is expected to result in a major expansion in use. Installed on key stripping units and in supervisory cars and service trucks, f-m provides these major benefits.

1. A major reduction in loss of time through breakdowns or service failures affecting stripping equipment. Communication from operator's cab to service truck, shop or headquarters is instantaneous, thus permitting prompt repairs and prompt attention to service difficulties.

2. A major increase in supervisory efficiency. Formerly, a large part of the time of key supervisors was devoted to getting from one place to another. Now, supervisors can check on pit condition and operating results merely by calling. An incidental benefit is a substantial reduction in cost of automobile and truck operation.

Maintenance and Service

In view of the heavy investment per equipment unit in stripping, preventive maintenance and good service take on added importance. Ways and means of attaining better results include:

1. Trained men backed up by good shop facilities.

2. Careful, frequent inspection and good records on delays and their causes.

3. The best in lubricants and lubricating methods. The modern trend is toward special lubricating trucks operated by experts in lubrication and inspection.

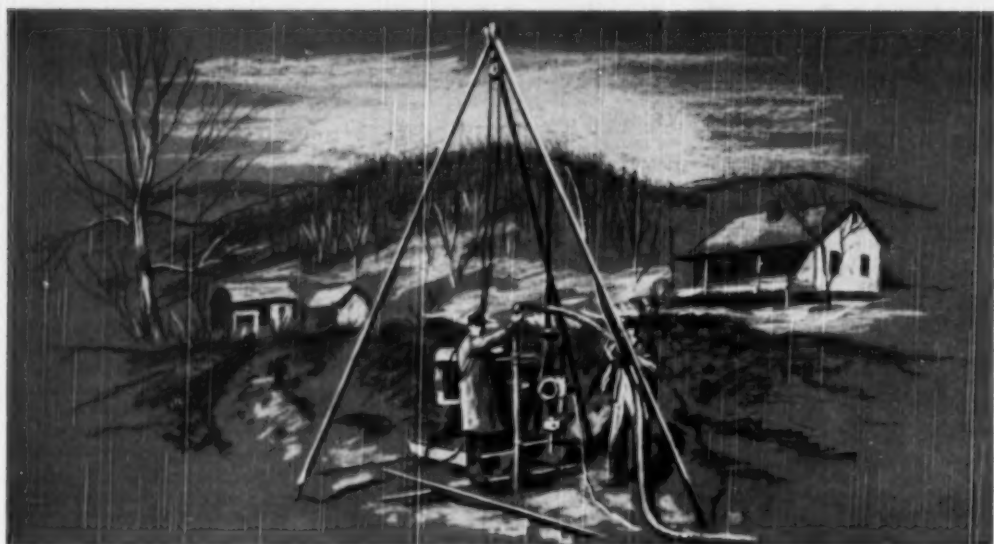
4. Highest-quality materials for strength and resistance to corrosion and abrasion. At one mine, gear trouble in shovel crawlers was practically eliminated by replacing old gears with heat-treated alloy

units. And where there is major wear, hard-surfacing should be the rule.

5. Special fuel, welding, line and repair trucks for more efficient and economical field service and reduced delays for production units.

6. Parts supplies and spare equipment units on or near stripping and other equipment.

7. Truck- or tractor-mounted cranes for field repairs and handling equipment and materials in yards.



INTENSIVE EXPLORATION to determine mining conditions is the first step in planning mine layout for higher efficiency and lower cost by taking advantage of grades and spotting proper locations for surface plants and auxiliary openings.

Deep-Mine Planning

1. Intensive Exploration
2. Retreat Operation
3. Concentration
4. Utilizing Gravity
5. Facilitating Service
6. Panel Planning

OVER-ALL EFFICIENCY in deep mining is as much a function of the mining plan—both general and for individual working sections—as of the equipment installed and the way it is operated. True, the terrain and other natural conditions at the mine location may limit the opportunities in over-all planning, but some do exist under any set of conditions. Again, the larger proportion of the production necessarily comes from mines already in existence and here the plan of development may be difficult to change. Even here, however, there are opportunities at practically all operations for making revisions that will reduce future cost.

With hand loading, a low wage rate and a relatively low investment cost for both production and preparation facilities, it was relatively easier in the past to get by with a poor choice in the mining plan. Now wages are high and the cost of modern preparation facilities,

for example, runs as high as \$5,000 per ton of hourly capacity where the refuse content is high and cleaning and drying is carried down to the extreme fines.

These costs, among others, tend to lead to the development of higher-capacity, or larger, operations,

1. Intensive Exploration

Nothing is more essential to efficient mine layout—or to a revision in existing methods—than complete and accurate information on both seam and surface conditions. In other words, the cost of a diamond core may be repaid many times over

2. Retreat Operation

Full retreat, provided the mine has been properly projected, is practically always a guarantee of low over-all cost over the life of the

though there are exceptions. The larger the operation and the longer the life, the more need for care in planning to achieve maximum cost reduction over property life. And while the pressure may not be as great in the smaller or shorter-lived mines, the same care in layout can assure significant cost advantages.

Existing mines, as pointed out, pose a different and perhaps more difficult problem. As with new mines, however, opportunities for improvement exist in some or all of the following directions.

in reduced cost of drainage, haulage and the like as a result of being able to take advantage of grades or other conditions in planning mine layout. Even in existing mines, drilling and other exploration may make possible a change in approach that will substantially reduce operating cost.

property. Among the reasons are:

1. Openings through solid coal are less susceptible to disturbance and therefore are easier to maintain in tip-top condition.



AUXILIARY SERVICE OPENINGS, properly placed, reduce travel distance for men, and haulage and transmission distances for supplies, air, power, water and the like, thus cutting cost in the important field of service labor.

2. Concentration on development means a better opportunity for getting a first-class job done in track work, roof support, power supply, drainage, sprinkling systems and the like because such service construction is handled as a normal part of construction rather than intermittently and perhaps haphazardly where emphasis is on production rather than development.

3. Troubles from such things as caving, water inflow, gas and no on are behind the active workings rather than in front and sealing or otherwise handling them is easier.

4. New facilities in the best of condition are available at the time when the haul and service distances are at their peak, thereby making for maximum efficiency at the most critical time.

Developing to the boundary before starting production still involves time and capital, but the problem has been rendered considerably less critical by the speed of advance made possible by modern mechanical-mining equipment. And where full retreat is inadvisable, acceptable compromises include mining on one side of the property on the advance and on the other side on the retreat. When it comes to working sections, the trend is definitely to full retreat, with half advance and half retreat again a popular compromise.

3. Concentration

Scattered working sections normally mean, among other things, that additional entry and accompanying service facilities must be provided and maintained, running up investment and maintenance per ton of daily output and increasing the difficulties of getting satisfac-

tory service and supervision. In view of the critical roll service labor plays in tons per man (p 71), the utmost in concentration of working areas is essential.

Concentration is easier to achieve with the new continuous mining machines, and as more of them go into service, working territories will be correspondingly reduced.

4. Utilizing Gravity

Where advantage can be taken of it, gravity is the cheapest of all forms of power. Therefore, every effort should be made to utilize gravity in moving coal, water and any other material lending itself to such movement. This highlights the importance of intensive exploration to determine grades and seam conditions. With these accurately known, it is easier to design or revise a mine to take fullest advantage of grades in moving material. In some instances, an in-

crease in the cost of a road or railroad spur may well be warranted to get the benefits of a location favoring short underground hauls and grade utilization, thus substituting gravity for additional equipment and service labor.

Likewise, where it is necessary to work against gravity, which cannot be completely avoided, accurate knowledge of conditions will permit, as in pumping water, reducing the lift against gravity to the minimum possible, with accompanying savings in power and other costs.

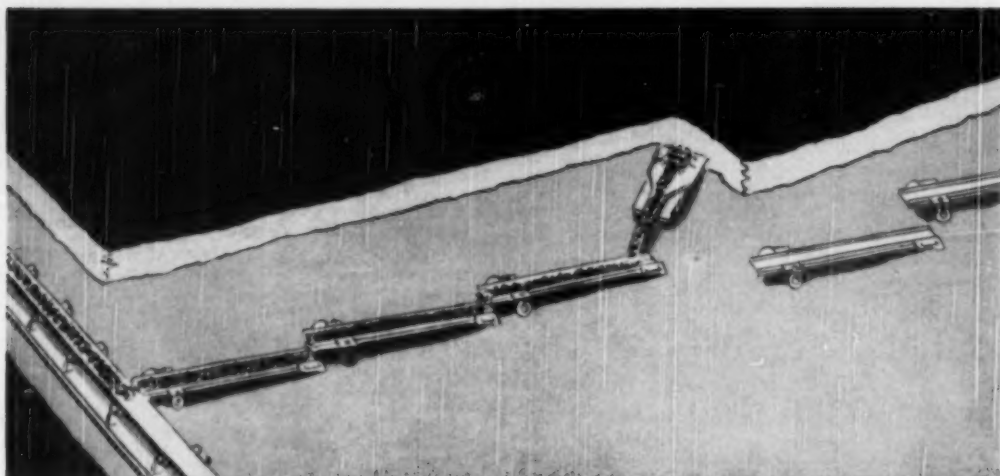
5. Facilitating Service

In view of the important role of service labor in cost, not to mention the high rate of wages men receive for mere sitting and riding, mine design and revision necessitates careful study of the question of service openings for supplies,

power, drainage, ventilation and other operations, as well as for handling men. Among the points to be considered are:

1. Type of service opening, whether drift, slope, drill hole or shaft.
2. Location with respect to points

NEW MINING HORIZONS—Deep-Mine Planning



SEMI-LONGWALL, by greatly increasing tons to be loaded without machine moves, offers the possibility of major increases in unit and per-man output, particularly with conventional equipment. Problems to be solved include positive roof control.

where the greatest good can be accomplished with the least cost of construction and operation.

3. Adequate connecting or transmitting facilities in the mine. As an example, air velocity and power are directly affected by available airway area. Normally, therefore, the highest efficiency is attained by providing enough area, by increasing number of headings or otherwise, to keep velocity at a low figure. Four headings, therefore, may be much better than two.

What Auxiliary Openings Do—

The function of service openings is to reduce distance or make possible reducing the cost and raising the efficiency of certain service operations. A high-voltage pole line on the surface, for example, may be less costly, including the outlay for the auxiliary openings, than a lower-voltage cable underground. Reducing distance also reduces the cost of moving air, pumping water or hauling supplies, as examples. Reducing distance also means more productive work from employees, thereby cutting mining cost.

Normal-sized boreholes are finding increased favor as a means of cutting power and drainage costs. Big boreholes, usually costing considerably less than shafts to put down, are being used more and more to cut ventilating cost and provide emergency exits to the surface.

Where supplies or men must be handled, drifts, shafts or slopes are the major answers. In any case,

cost must be balanced against possible savings. In other words, the cost of interest, amortization, operation and maintenance, trans-

lated into cents per ton, must be substantially less than the prospective savings through better service or reduced travel time.

6. Panel Planning

Planning of working sections or panels might be considered as even more important than over-all mine planning, since it is in the realm of face operation that the greatest opportunity presently exists for reducing labor cost. Some of the questions that must be answered in such planning are:

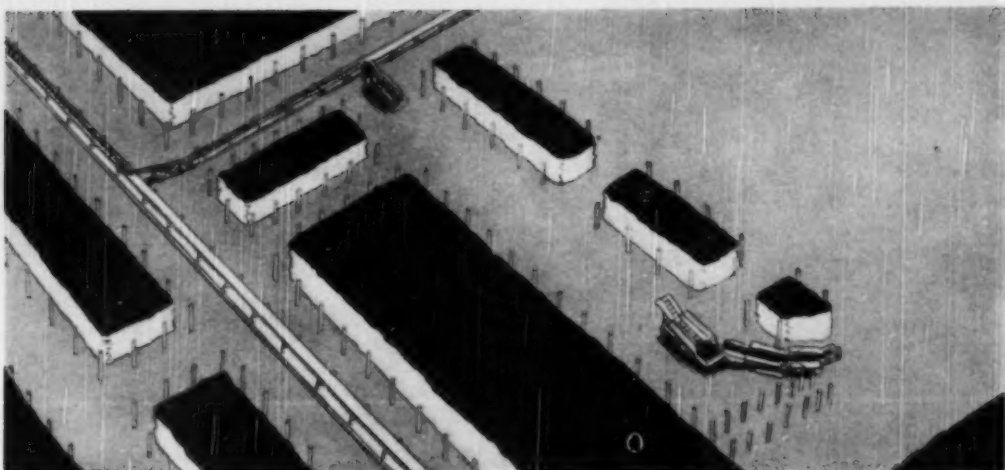
1. Are sufficient working places provided for maximum production from the machine employed?
2. Does the heading layout provide for quick changing of trips or cars where used?
3. Does the heading and room layout provide for good ventilation, bleeding gas directly into the return, easy travel for men and efficient delivery of supplies and repair parts?
4. Are auxiliary escape openings available for emergency use?
5. Does the plan take advantage of natural conditions to reduce roof and other troubles?
6. Does the plan provide maximum tonnage per fall?
7. Are proper provisions made for changing points in car-and-locomotive service to machines or for otherwise keeping the length of the service haul down to permit

maximum machine operating time without additional service labor and equipment?

Adequate Working Places—

With conventional loading units, particularly of the mobile type, the quantity of coal available has, as a general rule, a major bearing on output and productivity per man. Where conveyors are used for room transportation, the necessity for keeping the number down necessarily restricts the number of working places rather sharply and puts emphasis on tightening up the cycle in each place. Nevertheless, when it comes to a choice between, say, 2 or 4 places, it may be best in the long run to select the larger number to provide more elasticity in the cycle and thus reduce loader delays.

The basic test is the relation between output per unit and output per man. In some instances, a lower unit output with a smaller crew may result in the highest tons per man. Normally, however, the opposite situation prevails. As an example, attempting to operate a mobile loader in only four to five places with 10 men might result in a productivity of only 22 tons per man, whereas increasing the number of places to 10 and the crew to 15 might boost tons per man to 24.



MODIFYING PANEL PLANS to increase tons per fall or take advantage of machine characteristics leads to higher efficiency and lower cost. Here, thinning down pillars permits extraction from the room without additional timbering.

Using Natural Advantages—In some mining areas, as an example of taking advantage of natural conditions, it has been found that drawslate can be held fairly well in one direction but must be taken down in openings at 90 deg. By properly planning the room, cross-cut and pillaring layout, therefore, the percentage of drawslate that must be handled is kept to a minimum.

Using Machine Characteristics—With a long swinging head on a mobile loader or miner, room-and-pillar, for example, may be modified to achieve cost reductions in directions not otherwise possible. The answer is reducing the thickness of the pillar to the point where the head, with the machine in the room, can reach across it. Through quick extraction, plus, perhaps, leaving small stumps and fenders, it therefore becomes possible to mine the pillar without using timber beyond that normally necessary in the room. Where conventional mobile loaders are employed, cutting becomes a factor, meaning that institution of this system would require going to the longest-possible cutter bar.

More Tons Per Fall—Room-and-pillar, as indicated elsewhere in this issue, is and probably will remain the major mining system for some time to come—even with the new continuous miners. But, especially with the conventional mobile loaders, it means a lot of moving be-

cause tons per place is necessarily limited.

How can tons per fall be increased? Aside from deeper cutting, one answer is careful study of natural conditions to see if the place can be widened. In addition, the roof bolt promises real help in that direction. Some users report that experience to date indicates that roof bolting will permit increasing place width up to 50% or more with even greater safety than before and, of course, easier loading because of the elimination of posts and crossbars. Adding in the possibility of deeper cutting—up to 50% or more—the chances thus become good that tons per fall can be doubled, thus cutting machine moving time in half, in addition to reducing the proportion of less-efficient clean-up time.

Semi-Longwall—In spite of the best that can be done, room-and-pillar mining, especially with conventional mobile loaders, still involves a substantial moving time. That is the reason why semi-longwall is receiving increased attention, which attention may lead to expanded use in the future—with the help of such suggested equipment as a heavy-duty self-moving jack to permit the necessary roof control. Inability to control the roof and keep faces open without expensive cribbing, packwalls and the like has severely limited the use of semi-longwall in the past in the United States.

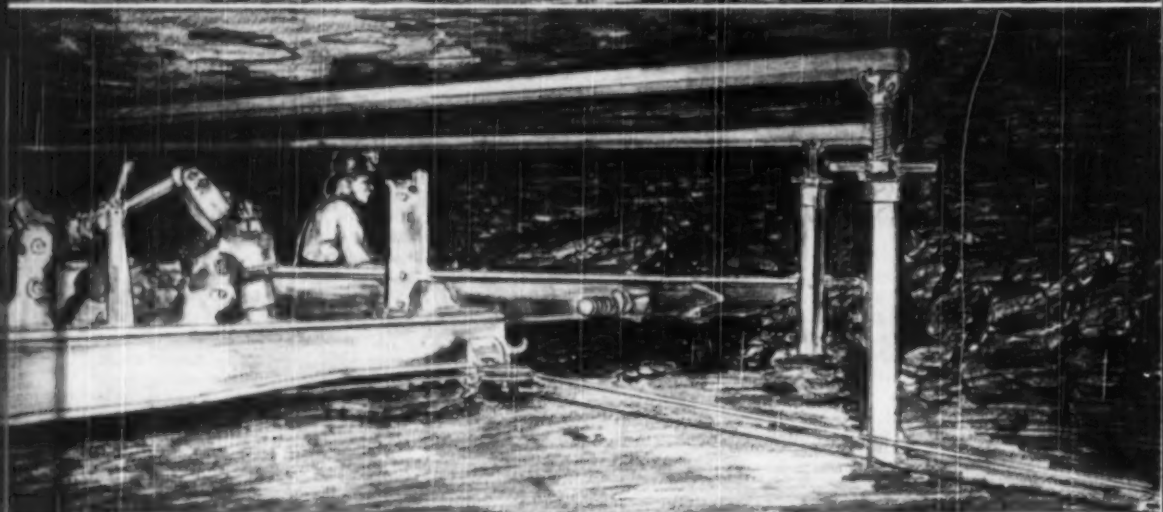
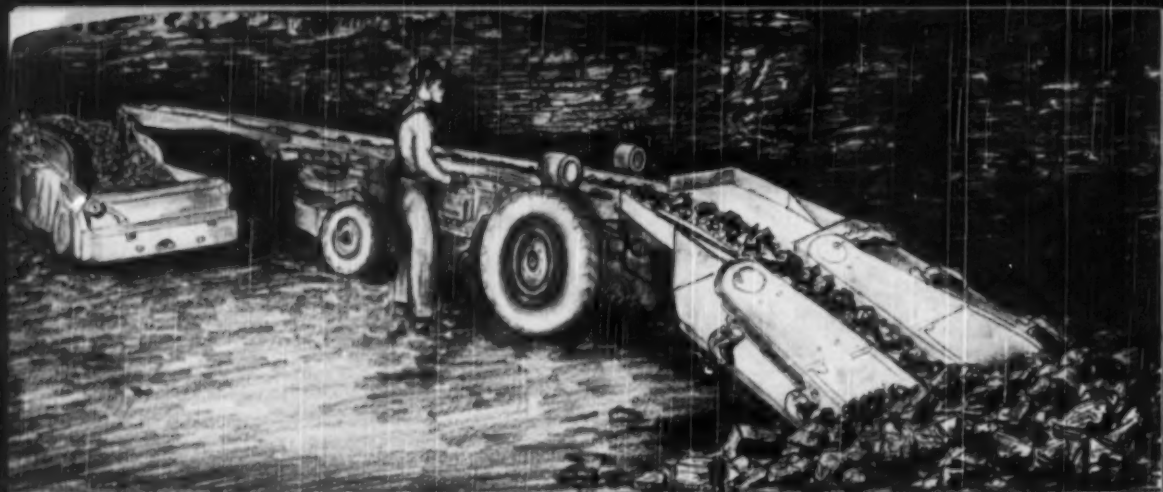
A big reason why the possibili-

ties of semi-longwall are worth more intensive study is the fact that coal for a half to a full day's loading can be provided in one place—a major factor with conventional loading machines particularly.

For example, allowing 1½ hr for travel and lunch and 1 hr for delays, a conventional loading machine able to average 4 tpm could produce 1,380 tons per shift. Such a tonnage could be cut and loaded by the usual equipment, but special transportation facilities probably would be necessary to handle it on walls as long as, say, 300 ft or more. But if transportation could be worked out, a crew of 20 men might be adequate in coal 5 ft or so thick. Face production, therefore, would be 69 tons per man as a result of cutting non-productive loader time to less than 15%.

Semi-longwall is proposed for at least part of the continuous miners now being manufactured or developed, though, since they are designed to work continuously in one place, semi-longwall does not offer outstanding advantages with certain of the mobile types. With the planer, on the other hand, the object is to take advantage of semi-longwall principles. One type of planer unit probably scheduled for early installation features built-in conveying and roof support.

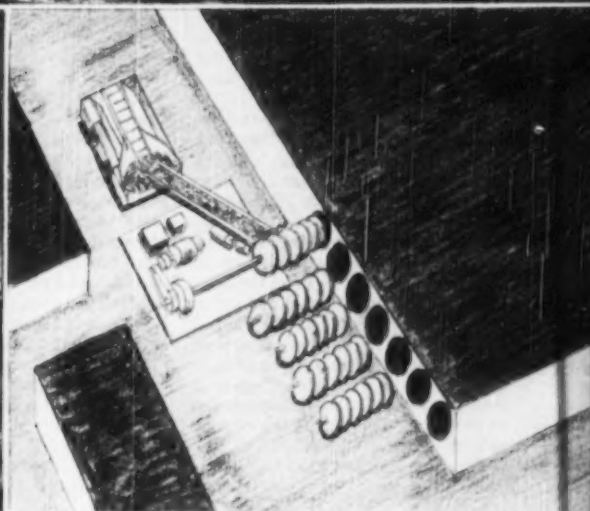
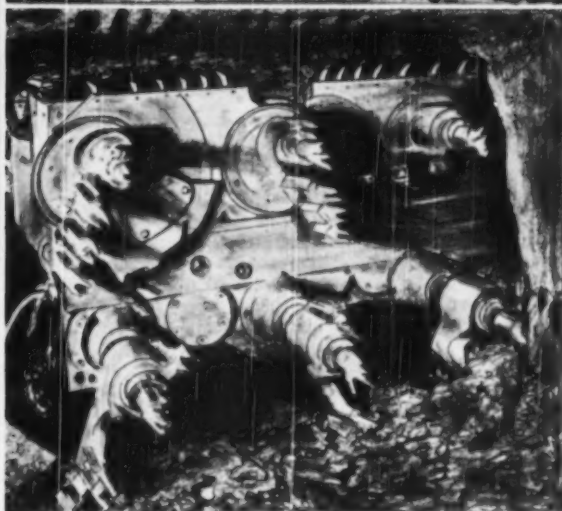
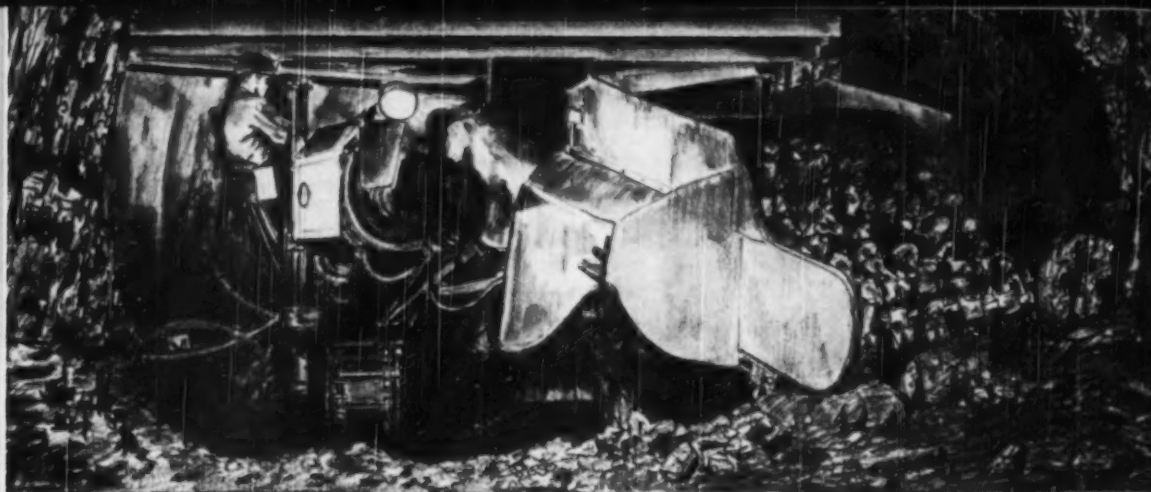
In view of the possible cost savings it seems logical to devote intensified study to panel or working-section plans with the idea of modifying them or replacing them with plans of a different type.



TODAY More and better use of present mechanized-mining equipment assures high production per man—up to 40 tons or more per man-shift in thick coal.

Opportunities in Loading

- ★ What the Present and the Future Hold in Tons per Man With Loading and Mining-and-Loading Units
- ★ What Capacity, Balance, Crew Size and Cycle Study Mean in Attaining High Efficiency



TOMORROW New machines and new methods of mining promise substantial increases over present tons-per-man-shift levels in both thick and thin coal.

MECHANICAL-LOADING equipment is inherently cost-cutting equipment because it substitutes machinery for muscle, thereby increasing individual productivity. And since productivity in face operations, as pointed out in an earlier section of this issue (p. 71), is normally less than in service operations, it is logical to concentrate on

this phase of the mining problem.

For maximum results, two steps must be taken:

1. Installation of the best machine available for use under the prevailing mine conditions.

2. Operation of the machine to achieve as near its rated capacity as possible. This is vital because, while mere installation of the ma-

chine results in a substantial increase in productivity, a further increase of equal or greater magnitude is possible by efficient operation. The result is a greater return on both the investment in the machine and in the labor to operate it.

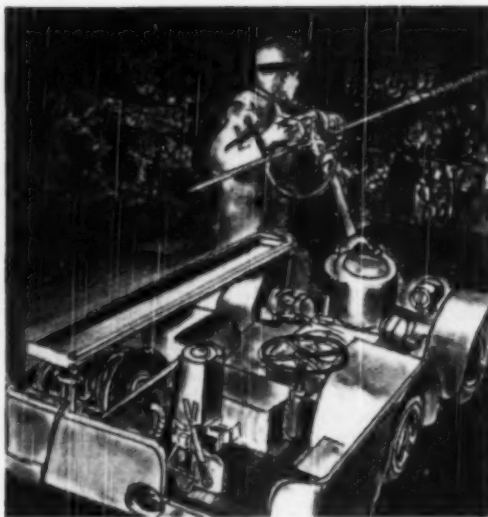
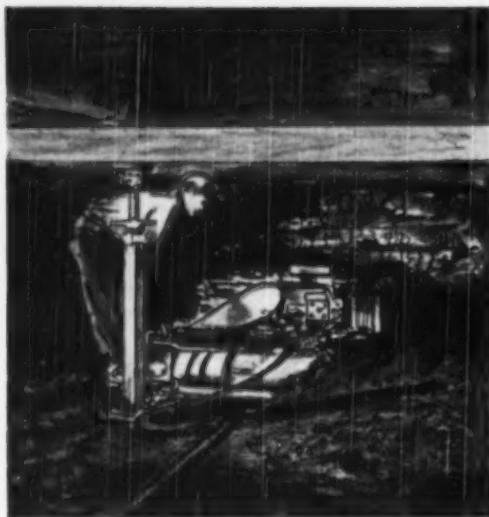
In more detail, factors involved in the efficient mechanization of loading include the following:

Equipment

TODAY In thick coal, the mine operator now has available for use at the face the mobile loading machine, the scraper, the self-loading conveyor and at least three types

of the new continuous mining machines, including the big auger. All these are capable of doing their own loading, with the continuous units also capable of doing their

own mining. In addition, the operator can use the conveyor or hoist-operated hauler to improve hand-loading efficiency through better room transportation.



BETTER LOADABILITY with increased economy in the face-preparation cycle is provided by extension of power to such operations as bugdusting and drill-positioning, plus use of high-capacity machines, modern bits and breaking mediums, and efficient methods.

Face Preparation

Machines, Bits, Breaking Mediums and Methods for Faster Loading — Preparation Without Shooting — Support Without Interference — Mechanized Rock Handling

COAL MUST BE BROKEN out of the solid with conventional loading equipment and put in a form that will permit high-rate production with a maximum percentage of the more-valuable coarse sizes. At least that has been the requirement heretofore, though recent experiments indicate that all the steps necessary in conventional face preparation may not be necessary under the proper conditions.

Face preparation, in its broadest aspect, does not stop with dislodging the coal. The top must be properly secured and the place left so there will be minimum interference with the loading operation. Finally, for maximum efficiency, face preparation must be carried out with a minimum of labor, and equally important, especially with machine loading, to provide the maximum coal per fall.

Tons per Fall

Coal in place for loading is directly reflected in moving time

where conventional mobile loaders are employed. And where hand-loaded or self-loading conveyors are installed, more tons per fall means more loading for the same number of cycles, with consequent reduction in the delays and deadwork normally encountered, and possibly either a reduction in crew size or greater production with the same crew. Manifestly, doubling tons per place means hauling machine moves or cycle repetition. The time saved naturally permits an increase in unit production with an accompanying increase in tons per man.

Width of Place—With the roof supports previously available, natural conditions placed rather stringent limitations on width per place. Now, roof bolting is seen as a major opportunity for increasing place width as much as 50% or more in some instances.

Depth of Cut—Where possible, changing from, say, a 6-ft depth of cut to 9 ft increases tons per fall

50% in the same width of place. With improved roof support, such as the roof bolt previously mentioned, deeper cutting results in an even greater increase in tons per place.

Cutting and Drilling

With cutters and drills, as with practically all other equipment, increased capacity requires no increase in operating labor as a normal rule. Mounted cutters and drills inherently have higher capacities than shortwalls or hand-held or post-mounted drills. Therefore, if a high-capacity loader can be employed, it should be given full opportunity to produce by cutters and drills that match it in output.

Attaining high capacity is not alone a matter of mounting the machine. It includes added power and such things as, in drilling, a present trend toward smaller holes. Smaller holes, along with increased power, and extension of power application to drill motions and positioning, save time and increase capacity. Smaller holes and hydraulic operation also are expected to reduce maintenance. Extra power, in addition, makes it possible to use the same drill, by changing to larger augers, for drilling big holes

for hitch timbering for top support.

Mounted equipment is not, of course, the universal answer to cutting or drilling problems. With non-mounted equipment, also, added power and such auxiliaries as hydraulic tilt and leveling for shortwalls permit increased output with no increase in labor.

Flexible-Shaft Equipment—The cutting machine, particularly the shortwall type, also can serve as a power source for other face operations by means of a power take-off and flexible shafting. The major application to date is the flexible-shaft drill. Taking the motor off reduces weight and eliminates electrical troubles. Speed and power are increased by the increase in motor size available. Other suggested uses for flexible-shaft power include roof-bolting drills, gathering pumps, face conveyors, and so on.

Bugdusting—The power bugduster already has solidly entrenched itself in the field of shortwall cutting. A major reason is reduced labor. A second is a better job of bugdusting. Others include reduced power and maintenance. The situation, however, is not so happy where mounted cutters are employed particularly in undercutting. Here, there is a real need for a power bugduster that will extend the same advantages to mounted cutting.

Bits—Since the bit is the means by which power is applied to break the coal loose, the advent of continuous mining has spotlighted bit design and material. Even before that, however, major progress had been made in increasing cutting and drilling capacity by speeding up the operating rate and reducing number of changes per shift by developing longer-wearing bits requiring less power and reducing wear and tear on the machine. As a recent example, changing to a modern bit at one mine cut changing time in hard cutting from 15 to 5 min per place.

Methods of increasing tons per bit change in both cutting and drilling include hard-surfacing, special alloy steels with or without hard-surfacing, and bits with carbide inserts. Proper attention to the surfacing of either standard or alloy bits tends to promote a self-sharpening action. And, some research has shown, increasing the rigidity with which the bit is held reduces power and increases

life, while new metals, alloys and designs are expected to provide further benefits of a major nature.

Dislodging the Coal

How coal is cut, drilled and dislodged, including choice of the breaking medium—explosive, carbon-dioxide, air or hydraulic—influences not only cost of face preparation but also the efficiency of the loading operation. In other words, good breaking is not only cheaper but also increases loadability, or the ease with which the coal can be picked up. In addition, proper choice of the medium and method permits a substantial increase in the percentage of coarse sizes.

Straight ribs and an even bottom are critical factors in cutting. Bugdusting is a vital auxiliary operation in that it materially increases the efficiency of the breaking operation by insuring that the extra free face is really free. Shearing can reduce the number of holes and thereby powder consumption, along with improving the yield of coarse sizes and increasing loadability. And by reducing the drilling burden, shearing, provided the cutter has the necessary capacity, can permit high drilling coverage with a smaller investment in equipment and perhaps in manpower.

As in cutting, the drilling pattern is subject to variation in response to individual mining conditions. Nevertheless, there is a best pattern for each condition. Study is the answer. Depending upon conditions, the solution may be more holes. Normally, it is less, with a corresponding reduction in drill set-ups and drilling labor.

What can be accomplished by good cutting, drilling and breaking? Results at a number of operations show, for one thing, a reduction of as high as 50% in cost of explosives and detonators, a 10% or greater increase in loader output and up to 10% or more coarse coal.

Loading Without Shooting

While the conventional loading machine has never been considered a breaking or digging unit, recent experiments indicate that through multiple cutting and shearing it can load directly from the face without drilling and shooting. Additional cutting capacity is required and cutter maintenance is increased. Also, the percentage of fines is raised. Compared to shot coal, however, the initial experiments indicate a substantial in-

crease in productivity—up to 30 to 40 tons total per face man in coal as thin as 40 to 42 in. In some instances, the seams included substantial partings.

Modern Support

New developments in equipment and methods now ease the problem in another phase of preparation for loading—roof support. Supports hitherto available include roof and timber jacks permitting quick and easy installation of crossbars and, in addition, providing a temporary and easily shifted spot support at the face.

For permanent support without legs, the coal drill, with a bigger auger, is used at some operations for making hitch holes for crossbars at the same time the face is drilled. Compared to using legs, the process is reported to be faster and more economical.

Speeding up the process, the timbering machine, frequently accompanied by a trailer for posts, bars and wedges, has proved its ability to cut room-timbering cost in mining with mobile equipment. In many instances it has permitted a reduction in crew size, along with a significant increase in output as a result of better conditions.

The roof bolt is a rapidly growing means of roof support in working places. Where a layer of draw-slate or stone pulls down rather easily, some operating men see a real opportunity for clearing the face area of posts or jacks by pinning the slate or stone up with bolts until it can be caught on regular supports. The goal is a major increase in loading time through eliminating interference.

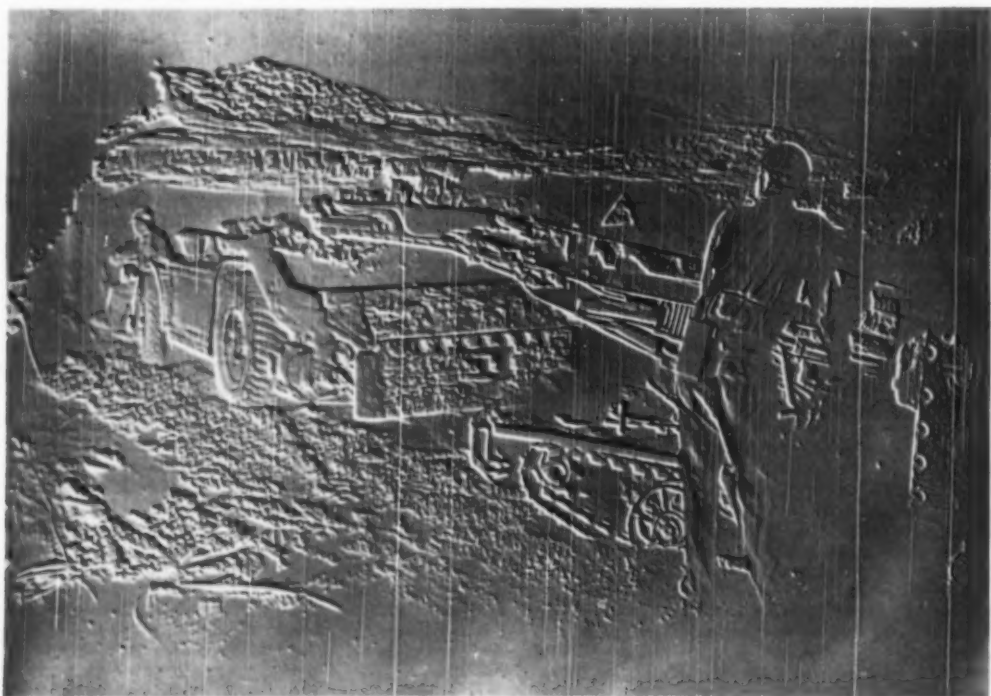
Handling Rock

Where partings or slate, or both, are encountered, the growing practice is to mine and load them with the coal. If this is impractical because of preparation and refuse-disposal limitations, or if, as may be the case, it appears less costly to dispose of such refuse underground, maximum results are again attained by mechanizing the operation by machine cutting or loading, or both.

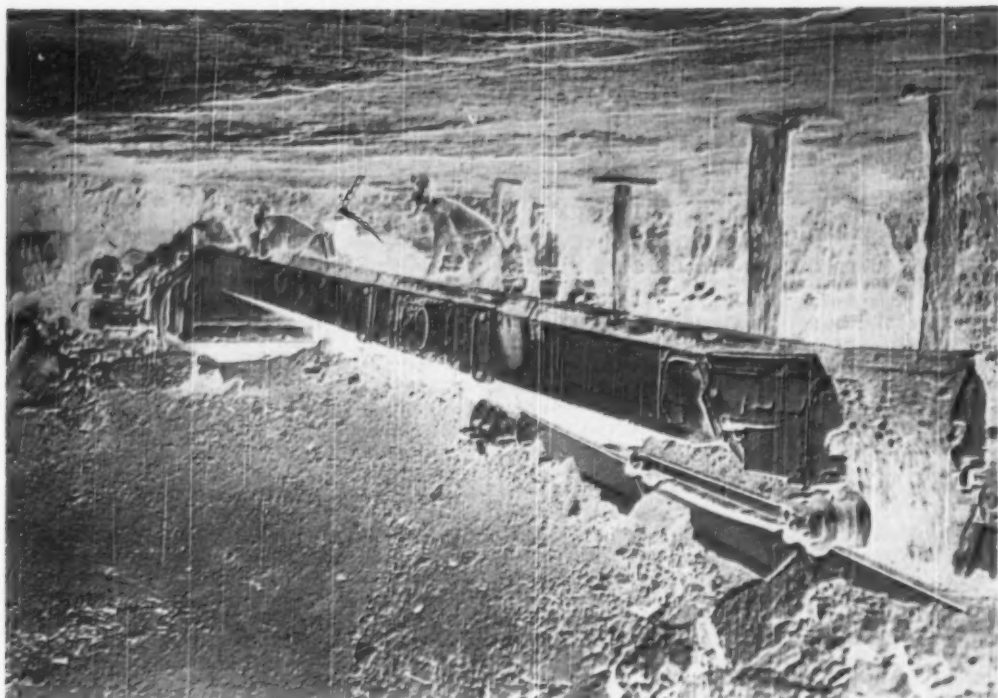
Partings may be cut out or removed by shooting, raking, etc., after loading of the top or bottom bench. To reduce disposal cost, special storage places are provided at some operations. Storage in such places has been done with both shaker conveyors and shuttle cars.



BIG CARS AND SHORT CHANGES materially increase loader output by reducing changing time.



SHUTTLE-CAR PERFORMANCE is improved by using the largest-possible units and keeping speed up.



PIGGYBACK CONVEYORS promise increases in unit output of as much as 300 to 400%.

Raising Loading Time Through . . .

Better Face Transportation

Eliminating Indirect Delays

Trip Changing and Loading

Service With Wheeled Equipment

Service With Conveyors

HOW EFFICIENTLY the coal is taken away from the loader—whether man or machine—is perhaps not the No. 1 element in high face productivity. Certainly, however, it is a critical one, since expenditures in both money and effort to increase efficiency in other phases of the cycle will fail if coal cannot be moved out as fast as it is produced. In other words, without efficient transportation to back up the loading facilities and auxiliary equipment, there cannot be maximum production from these facilities.

The goal should be a transportation system that is always in place and ready to receive and carry coal any time loading is in progress. Furthermore, the system should

have sufficient capacity to handle any peak rate of production the loader or miner is capable of reaching. Finally, the system should operate with a minimum of manpower and maintenance.

This involves elimination of both indirect and direct delays and the use of low-maintenance equipment with adequate capacity, speed and ability to operate as near continuously as possible. Finally, it means haulage and working layouts that assure maximum efficiency in service to production equipment.

Eliminating Indirect Delays

Aside from such items as the capacity of the haulage medium, distance to be covered and other direct transportation considera-

tions, efficiency and continuity are influenced by a number of indirect factors. Among them are:

1. Equipment breakdowns—loco-

NEW MINING HORIZONS—Better Face Transportation

motive, shuttle car, conveyor, elevator, spotting hoist, etc., including trailing cables.

2. Deraillments—where cars are used. In addition to time lost, such deraillments result in equipment and haulageway damage and personal injuries to men.

3. Muddy, rutted or dusty shuttle-car roads, which slow down travel and increase the possibility of mechanical and electrical failures.

4. Right-angle turns, narrow places and close or improper timbering along haulage routes, not only slowing down the speed of travel but increasing the risk of collisions and interference.

5. Delays at discharge stations.

6. Delays resulting from the moving or extension of equipment, such as conveyors, elevators, etc.

7. Interference—between equipment units using the same openings, in supply-handling, and so on.

8. Lack of mine cars.

What the Remedies Are—The fact that delays such as the preceding can run up to an hour or more per shift frequently is not realized. Time studies of face operation will determine them with reasonable accuracy. Once determined, the remedies become obvious. They include:

1. Thoroughgoing equipment maintenance accompanied by maintenance of voltage at or above the

motor rating. The latter in itself is a long step toward reducing breakdowns and maintenance expense, as well as delays.

2. Good construction and maintenance of tracks and roads.

3. Study of the mining plan to arrive at a layout that will permit operation with a minimum of interference between equipment units and between production and service operations. Normally, this means providing sufficient openings to supply separate and distinct routes for all haulage units, for other equipment and for service.

4. A main-haulage system—and sufficient cars—to provide an unfailing car supply to the working sections.

Trip Changing and Loading

While always a factor in mechanical mining, the growth of the shuttle car and the mother belt has emphasized the importance of eliminating loss of time in changing trips. If 5 min eight times a shift is required to change trips, and if there is a further delay because the unit must be stopped between each car, the total loss will have a major effect on the efficiency obtained with, for example, a unit made up of eight self-loading conveyors, each operated by a three-man crew and served by a mother belt.

Planning for Continuous Loading—Means of accomplishing continuous trip loading include:

1. Providing equipment for changing coal flow from one car to the next while the trip is being moved, thus making it unnecessary to stop loading. This is particularly important with conveyors serving several production units. Means range all the way from spill plates placed by hand to bridge the gap between cars to short reversible conveyors on the ends of the main conveyors to change the flow from the front to the rear car.

2. Planning track layouts and trip-changing methods to materially reduce or eliminate delays. While the details necessarily will vary from mine to mine, the general principle is arranging the track so that the loading section can be reached from both ends. This is done by (a) double-tracking with crossovers, (b) sidetracking, either in the same or adjacent headings, or (c) looping.

Where conditions make it necessary to change trips either by pulling or pushing them out and bringing the following ones in from the same end, the time interval may be materially reduced by having the crossover as close to the loading station as possible and using automatic couplers to speed up the operation. Thus, short trips may be changed in as little as 10 to 15 sec.

Automatic Changing—While automatic changing of full trips is not inconceivable, it is probably not to be expected in the immediate future because it involves the extremely difficult problem of making the complete track-haulage system fully automatic. Changing from

car to car, however, is a much simpler job, and consequently a high degree of mechanization, with corresponding reduction in manpower, has been made possible by remotely controlled trip hoists, locomotives and Barneyes, supplemented, naturally, by automatic equipment to transfer coal flow from one car to the next. A further step now under consideration is design of an automatic car feeder that eliminates manual control and is supplemented by a panel to show car supply.

Since trimming normally is needed at conveyor discharges, even full-automatic trip-changing equipment probably cannot eliminate labor at this point. But, where shuttle cars are used and discharge to mine cars, it is considered quite possible, by use of a transfer chute or conveyor and a remotely controlled hoist, for the shuttle-car operator to take care of car-loading and moving after trips have been placed by the main-line or relay locomotive. With the automatic transfer, shuttle-car discharge can be continuous, eliminating interruptions and time losses in this phase of the cycle.

Service With Wheeled Equipment

The ability of wheeled equipment—mine cars or shuttle cars—to deliver a given tonnage per hour without loader delays is a function of unit capacity, number in service and distance of travel. Again, continuity of operation and ability to

handle peak production rates are the major goals. Some of the factors in achieving them are:

Mine Cars—Since mine cars normally must be delivered by single haulage units, there is a greater

problem involved in reducing the unavoidable delay necessitated by the need for changing. Since the time required per change is the same for a given distance and locomotive speed, regardless of car capacity, a major method of re-

ducing changing delays is increasing car capacity. If, for example, a place makes 30 tons and average changing time, including switching, is 1½ min, nine changes are necessary to clean up (no time charged against the last car because the loader would move). Total changing time therefore is 13½ min per place. Now, if it were possible to use 10-ton cars, total changing time (two changes for three cars) would be 3 min, a saving of 10½ min per place.

Changing distance is a second major factor in mine-car service to loaders, though it becomes less important as car capacity rises. But if five changes are necessary to clean up a place, the changing point is 300 ft away, and the average travel speed is 300 fpm, total travel time per place is 10 min. If, on the other hand, the changing point is only 150 ft away, total changing time is half the former figure, representing a saving of 5 min per place.

Methods of achieving a short

change are based on installing changing switches at the necessary intervals to keep the distance within the desired limits. A major aid in achieving this goal is prefabricated switches, which reduce switchlaying labor. More preferable, however, is complete prefabricated track, which not only provides the changing points automatically but also has a beneficial effect through introducing more system and order into the whole problem of developing and mining a panel.

Shuttle Cars—Capacity and distance again are vital factors in servicing loaders with shuttle cars. Average discharge time ranges from 30 to 45 sec. Thus, with two cars, an average loading rate of 3 tpm and a discharge time of ½ min, the total allowable travel time, beyond which the loader has to wait, is 1½ min with a 6-ton car.

Theoretically, therefore, at an average shuttle-car speed of 300 fpm, the maximum travel distance, one way, is 225 ft. If the speed can be

raised—as is the case at many operations with good roads and good layouts—the distance is correspondingly increased. Increased car capacity has the same effect. And if the average loading rate is less than the 3 tpm used in the preceding example—apparently the case at many properties—the practical distance is again increased. Finally, though it represents an additional outlay for equipment and labor and increases the chances of interference, a third car may be employed when distances begin to lengthen.

Getting more on the car helps in increasing its range. This has led to study of methods of “stuffing” shuttle cars, particularly in service behind continuous miners. And since discharge time is important in results attained, it is necessary to make sure that the rate is not reduced. For this reason, automatic controls to speed up belts to match shuttle-car discharge rates have been adopted at some mines employing belt equipment for gathering.

Service With Conveyors

Since it operates continuously, the conveyor theoretically is the most efficient of all transportation mediums. Practically, however, extension and moving delays and expense have militated against extensive use in the thicker seams where mobile equipment can be employed. In the thinner coals, however, and especially when equipped with a self-loading head, the conveyor has found relatively wide application because of the difficulty of using mobile equipment.

Now, however, as a result particularly of the advent of the continuous miner—where continuity must be exactly that for maximum results—the conveyor, including loading units used as conveyors, appears likely to find much wider application. Some of the suggestions to date, aside from standard conveyors with or without special receiving hoppers, are:

Loader Pick-Up—To divorce the continuous miner practically completely from the transportation system and thus foster continuity in operation, certain operators permit the miner to dump the coal on the floor. From this point, it is picked up by a standard loader and deposited in shuttle cars. Because of the higher capacity of the loader in

loose material it is able to keep the coal moving, within the limits of practical shuttle-car haul, despite the normal interruptions encountered.

Cascade Loaders—Another proposal, for entry-driving and wall or room work in thin coal, is a series of four or five standard or special loaders to pick up the coal and move it back to a mother belt. After, say, advancing 100 ft in one heading, the unit would move to the next to permit the belt to be lengthened. On wall work or in short rooms, cascading with the loaders would permit working to a maximum distance of, say, 100 to 150 ft.

Cascade Conveyors—Good initial experience is reported with using a series of short two-wheeled portable conveyors for serving continuous mining equipment. In fact, cascade conveyors are presently viewed by a number of mining men as a major answer to the problem of continuous production with transportation units that are reasonably easy to extend and move.

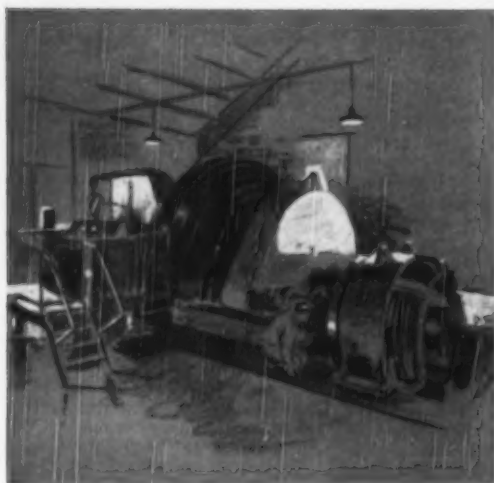
Piggyback Conveyors—If continued use confirms initial results of increases of as high as 3 to 4 times in unit output, the so-called

piggyback conveyor may be strong contender for honors in the room-transportation sweepstakes.

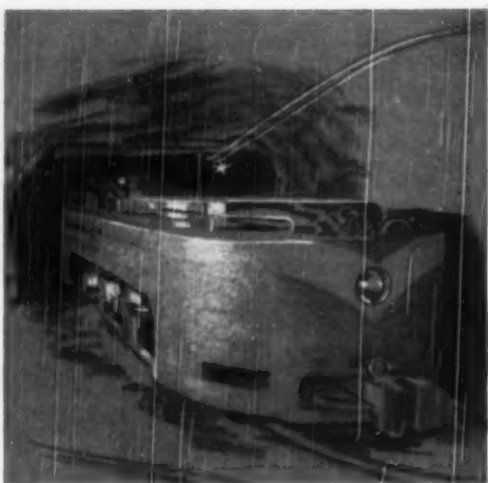
Essentially, the piggyback conveyor is a short chain unit with the outby end traveling on rollers on the sides of the main conveyor line. In one type, the inby end, which includes a hopper, is mounted on rubber tires that can be steered manually to position the unit as desired.

In a second type, the inby end is attached directly to the rear conveyor of the loading machine—after shortening to stub length. This provides a continuous connection from the loader to the main conveyor, and the operator can move and load as desired without looking back. As the machine moves backward and forward, and from side to side, the piggyback unit moves with it, riding back and forth on the main conveyor on the rollers.

A suggested modification of the piggyback idea, which might also lend itself to use with shuttle cars, is the mounted “nesting conveyor.” This is envisioned as a piggyback-type conveyor moving back and forth and feeding into a main conveyor, the whole being mounted on rubber tires or crawlers with motor drive to permit it to move under its own power.



AUTOMATIC CONTROL, plus mechanized car handling on the bottom, minimize labor where shaft hoists are used.



GOOD TRACK and good roof support, plus modern locomotives and cars insure efficient, low-cost rail transportation.

Main Haulage and Hoisting

How Automatic Hoisting, Belt Slopes, Good Haulage-ways, Good Rolling Stock and Modern Conveyor Layouts Help in the Critical Field of Service Cost

IN THE CRITICAL FIELD of service, main haulage usually looms the largest from the manpower standpoint, particularly if labor for the maintenance of track, overhead support and other essential facilities is included.

What the goal for good man-line haulage should be naturally is somewhat dependent upon individual conditions. But if the standards on p. 71 can be accepted as generally applicable, then good practice would mean handling 1,000 tons per shift with 15 men—eight hauling coal and seven extending and maintain-

ing track and timber as mining development proceeds.

Attaining or bettering these figures, and thereby making substantial progress in raising the limit imposed on over-all tons per man by service labor, requires careful analysis of methods and judicious expenditure of money to achieve the following:

1. Haulage facilities providing the maximum capacity per unit of operating labor.
2. Maximum use of automatic equipment.
3. Minimum maintenance.

of the speed-torque characteristics of the ac motor, but it still is considered possible to equip such hoists for automatic operation under average conditions.

Cutting Installation and Power Costs—Aside from automatic operation, major opportunities for reducing investment and power cost exist in increasing tons hoisted per trip. For example, 800 hp might be required for a given production rate when hoisting 2½-ton cars. With 6-ton cars, horsepower might drop to 600, while if an 8-ton skip was used, only 500 hp might be necessary. With existing shafts, replacing cages with skips is not unduly difficult or expensive and permits a closer approach to automatic hoisting and bottom operation.

Man - and - Material Hoisting—Elevator-type automatic controls already have proved their worth in reducing operating labor and speeding up the handling of men at a number of operations, in addition reducing the cost of handling supplies.

Automatic Slopes

Because of its automatic characteristics and relatively lower horsepower per ton handled, the belt has

Low-Cost Hoisting

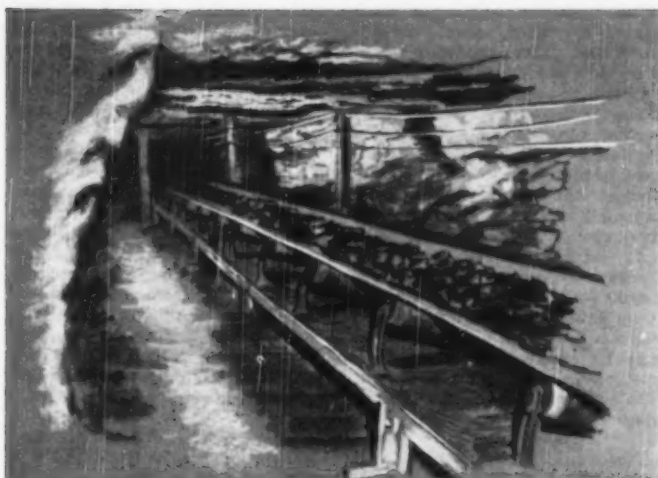
Automatic Shafts

Where shaft hoisting still is found to be the most economical on the basis of engineering analysis, the cost of such hoisting can be further reduced by, among other things, the following:

1. Automatic cagers and auto-

matic trip feeders and trip makers on the bottom, reducing caging and car-handling labor.

2. Automatic hoisting. Where dc hoists are installed, it is fairly easy to make them completely automatic except for the pushing of a button by the cager. Ac hoists present a more complicated problem because



CONTINUOUS OPERATION and minimum operating and maintenance labor feature modern belt installations for main-line transportation of coal.

largely superseded the shaft hoist at moderate depths. Like the skip in shaft hoisting, the belt slope permits a high degree of automaticity in car-handling and dumping. Also, it lends itself somewhat better to the construction of surge and storage facilities.

In the field of storage, in addition to regular bin equipment, an increasing number of mines are using by-passes and auxiliary stocking conveyors from belt-slope discharges to store mine-run either in a pile on the surface or in a hopper built over the upper end of the slope to permit feeding directly back of the belt.

Belt-Slope Future—For the same depth of cover, a belt slope must be approximately $3\frac{1}{2}$ times the length of a shaft, with consequent increase in the magnitude of the sinking and lining job. But by using mechanical muckers or, as in

a recent installation, such special equipment as boring-type entry-drivers, cost is materially reduced.

The eventual maximum length of belt slopes still cannot be stated. To date, the advantages of automaticity, low horsepower and efficient dumping have brought length, at one new mine, up to 3,130 ft, for a total lift of 862 ft.

Protection—As with other types of openings, operation of slopes with minimum maintenance labor and materials is a function of initial construction and lining. For the latter, concrete, gunite and steel liner sections are the major answer, with the liner finding increased favor, particularly in the area above the hard rock.

In timbered slopes or timbered sections, steel and treated wood are the major answers to long life without attention. Track naturally should be laid on treated ties.

Track Transportation

Low-Cost Haulageways

To contribute as they should to keeping down service labor and cost, track hauls should be designed and installed with at least two goals in mind:

1. Maximum size and speed of trip.
2. Minimum maintenance.

Tested ways of reaching these goals include the following:

Track—Assuming locomotives capable of the job, increasing average trip speed from 5 to 6 mph to 10 to 12 means, normally, twice the tonnage over the same stretch of track with the same equipment and no increase in operating labor. But to make possible speeds such as this, and to reduce track maintenance, a real construction job is a necessity. Doing it right costs more money, but the increase can be cap-

italized, whereas extra operating and maintenance expense is a direct and usually substantially larger burden on operating cost.

Attaining the best in construction includes the following:

1. **Good drainage**—Water has ruined more mine track than perhaps any other one thing. The answer is to get water off the haulage road and keep it off. If necessary—and some operators have found it pays—sumps and automatically controlled pumps should be installed to solve the problem.

2. **Good subgrade**—A firm base, topped off with good ballast, is the best assurance that track will stay in tip-top condition for an indefinite period.

3. **Long curves**—To permit maintaining trip speed at the maximum, and also to reduce maintenance, long curves are a necessity in modern track haulage.

4. **Heavy rail**—Light rail will not permit high operating speeds, aside from the fact that it is not suitable for heavy trips.

5. **Good frogs properly placed**—The frog, first of all, should be long enough to permit easy trip transit. Second, it should be installed in the right place. Third, it should be made of a material that will withstand wear, thus reducing operating troubles and turnout maintenance.

6. **Good rail joints**—Since the normal bolted joint, in addition to requiring a bond, also requires regular maintenance attention, the logical answer is a good weld.

7. **Long-lived ties**—Considering the labor cost necessary to replace a single tie, or even a number at one time, there is only one answer: the longest-lived tie that can be found, whether treated wood, steel or steel-and-wood composite.

Overhead—Haulageway overhead involves both roof support and trolley wire and feeder. With the latter, satisfactory service over long periods involves, first, use of the best materials; second, engineered location; and third, installation for permanent trouble-free operation.

Roof support is second only to track from the standpoints of cost and maintenance of haulageways. The goal is a permanent support which requires no further attention. In addition, it is beneficial in most instances to use a type of support that will not reduce haulageway clearances. Where wood is used, therefore, it should be treated. Aside from the possibility of roof

NEW MINING HORIZONS—Main Haulage and Hoisting

bolting, other answers are guniting and steel.

Hitching normally provides permanent trouble-free installation while preserving clearance. Drilling is the cheap way of making hitch holes. If the top must be completely protected, precast concrete slabs resting on the flanges of the I-beams, H-beams or rail crossbars is one way of doing it.

Track Cleaning—Part of the cost of maintaining haulageways is keeping them clean. One answer is tight cars to reduce spillage. Care in topping, elimination of low spots, and good track to reduce jolting and vibration in motion are additional steps.

With all the preceding and other precautions, however, haulageways still get dirty. To reduce cleaning cost, mechanization is the answer. Since special track-cleaning machines are designed for the job, the result in tons per hour usually is better. At one operation, as an example, a track cleaner pulled by one locomotive and serviced by another, and designed to clean 61 in on either side in addition to between the rails, works on a $4\frac{1}{2}$ -mi system. Average track cleaned per shift with two men is 2,300 ft. Some 30 tons of raw coal is recovered from the 50 tons of material produced. Considering this salvage coal, the machine actually returns a profit. Consequently, the investment has been liquidated in less than a year.

Grade Elimination—A heavy adverse grade, if it does not require extra locomotive equipment and operating labor, at least will require a larger, more costly unit for a given production. For that reason, and also because of the effect on power peaks and energy use, not to mention the safety factor, many operating men limit adverse grades on haulage roads to not over 1 to $1\frac{1}{2}\%$. With mechanized equipment, handling the rock is cheapened to the point where there should be no hesitation in setting strict standards.

Minimum Haul—The longer the distance trips must be pulled, the more the rolling stock and labor required for a given output. Surface and seam conditions frequently limit the possibilities in shortening hauls. In a number of instances, however, the main haul has developed like Topsy, either to follow good coal or avoid heavy grades.

Often, installing a direct route is barred by caved areas. Despite these and other handicaps, however, there frequently is an opportunity, as experience continues to show, for developing new and shorter routes. Cutting distance a mile—or even half that—frequently will save enough to show a handsome profit on the extra expense of grading and protection through old workings.

The bigger the haulage unit, the smaller, ordinarily, is the haulage expense. For that reason, where conditions permit, it may be economical to shorten the underground haul by constructing an auxiliary opening and transferring the coal into big cars or trucks for the final stage of the plant.

Automatic Controls—For every locomotive there must, of course, be an operator. In many other haulage operations, however, automatic equipment may be substituted for manpower on a rather broad scale. Use of automatic couplers, automatic doors and automatic switch-throwers, as examples, may permit operation not only without door and switch attendants but without trip-riders as well in main-line service. Even with trip-riders, automatic doors and switches eliminate stops and consequent loss of time and haulage capacity.

Along with other automatic equipment, dispatching, supplemented by communication units on the locomotives and block signals along the roads, permit efficient car distribution and eliminate interference and the possibility of collisions.

Low-Cost Rolling Stock

A second major item in the cost of track transportation is the capacity and maintenance requirements of the rolling stock—locomotives and mine cars. The goals again are maximum capacity and minimum maintenance.

Locomotives—Weight, power and speed are the major factors in determining the capacity of haulage locomotives and in turn the operating labor required. With locomotives already on hand, speed and weight can be attained by rebuilding and coupling in tandem, thereby more than doubling capacity with the same number of operators.

Maintenance and operating hallmarks of the modern haulage locomotive, all leading to easier, more economical and higher-capacity op-

eration, include: hydraulic or electro-pneumatic brakes, air sanders, hydraulic pole lifters, dynamic braking for operation on long grades, commodious and protected quarters for motorman and trip-riders, antifriction armature and journal bearings, totally enclosed axle bearings, provisions for cutting one motor out of the circuit in case of trouble, heavy frames, heat-treated gears, alloy shafts and axles, improved resistances, definite overload protection, heat- and oil-resisting wiring, Class B insulation and blowers for increasing rating, shoe-type current collectors, good spring and equalizer equipment, swivel trucks in the larger units, and other similar items.

Diesel Power—When the first diesel locomotive will go into regular service in a coal mine in the United States still cannot be stated. But wide use in other countries and in metal mines and tunnels in the United States undoubtedly presage eventual use in coal mines here. As an example of foreign practice, one Australian steel company has ordered 15 25-ton diesel units powered with 204-hp motors. Maximum drawbar pull in low gear is 15,000 lb. All controls, including gear changing, are electro-pneumatic, enabling one man to operate two locomotives coupled in tandem.

Mine Cars—Big mine cars, with automatic couplers, simplify main-line haulage by reducing trip length and easing trip-making. With high-strength alloy steel, the dead weight to be hauled per ton of coal is cut as high as 40 to 50% or more, with a consequent saving not only in power but in other items. In addition, as pointed out elsewhere in this issue, big cars materially benefit face operations by reducing changing time. And in the solid-body or drop-bottom types, they materially simplify dumping and consequently reduce dumping labor.

Even where the cars are not taken to the loading equipment, the operating advantages enumerated above, in addition to others, and the maintenance reduction possible with modern construction, have been found to provide savings sufficient to return the cost in very few years at a number of operations. Among the features leading to low maintenance are: special chilled or cast-, rolled- or forged-steel wheels; corrosion-resisting steel; anti-friction bearings; high-strength alloy axles, hitchings, pins and other accessories; spring, rub-

ber or other suspension; and spring, rubber or other draft and buffing gear, plus hydraulic or other improved brakes.

Low-Cost Layout

Since the goal of track haulage is cars for loading at all times, the layout must provide for sidetracks conveniently close to the working section. Normally they should not be farther away than the mouth of the panel, with some plans providing for maximum distances of not over 500 to 600 ft. And in several instances, the track layout provides for delivering trips at the loading station where shuttle cars or belts are provided, or at the most not farther than the first crosscut

away, thus reducing trip-changing time to a minimum.

The ideal in haulage layouts is separate tracks for both loaded and empty trips where more than one locomotive is employed. Consequently, that is the plan at certain operations—usually of very large capacity. An acceptable and lower-cost substitute, from the investment and maintenance standpoints, is passing tracks at strategic points. With dispatching, automatic signals, automatic track switches and other auxiliaries, a single track with appropriate passing points will provide much the same advantages as a double track even though the haul is long and a number of locomotives are in service.

Conveyor Transportation

Belt Features

How far belt haulage has progressed to date is indicated by the recent installation of a single unit, using a steel-cord belt, 10,900 ft long between pulley centers. Belt width is 30 in and the eventual capacity, at a speed of 400 fpm, is 350 tph. Power is supplied by a 200-hp motor. Normal operating labor will be one man patrolling and greasing, and the cost of moving coal is calculated at 2.3¢ per ton-mile over the two-mile distance.

Much-longer belt hauls, though made up of a number of separate units, each with a separate drive, went into operation as long as 30 yr ago. Then, as now, continuity in operation and a high degree of automatic operation, reducing operating labor to a minimum, were the major considerations.

The fact that in thin coal belt haulage in room entries would provide much of the preceding benefits and in addition would save considerable money through eliminating taking rock for height has been reflected in increasing use of mother belts over the years in the thinner seams, and in growing use in thick-coal operations because of continuity and automaticity alone. Growth in main-line and slope use is a further reflection of continuity and automaticity, in addition to lower power requirements, particularly in hoisting, plus new materials and new construction permitting major increases in length. Total practical length is yet to be determined but is felt to be substantially in excess of anything to date.

Stainless Belts—A possible challenger in the field formerly held by rubber and fabric is the stainless-steel belt. On the basis of work to date, experimenters see stainless steel as a practical material having a number of advantages in both conveyor design and operation. Possible commercial production, however, is some time away.

Installation

For maximum protection with minimum maintenance, belt openings, like track openings, need the best in roof support. Alignment and leveling of the conveyor is essential to trouble-free operation, along with maximum care in splicing where the installations are of a permanent nature. Preventive maintenance is important in belt life. Major steps are prevention of edge wear and the prompt repair of tears and gouges in the cover to prevent rapid destruction of the carcass through the entrance of dirt and moisture. Special belt shops, including drying facilities, have cut cost for several large users.

Feeding and Surge Facilities—Important factors in lengthening belt life are feeding in the direction of the belt travel, feeding to the center of the belt to prevent riding up on the rollers, providing hinged chutes or other protection against lumps hanging up where belts are fed from more than one point, use of cushion idlers to reduce impact, placing fines on the belt first, and giving the coal as much speed as possible in the belt direction to re-

duce impact still more and prevent bouncing and throwing.

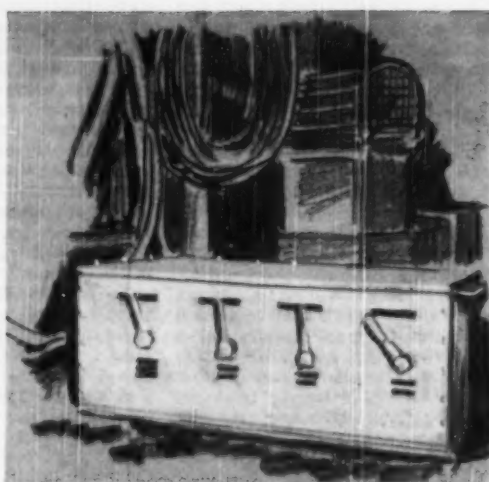
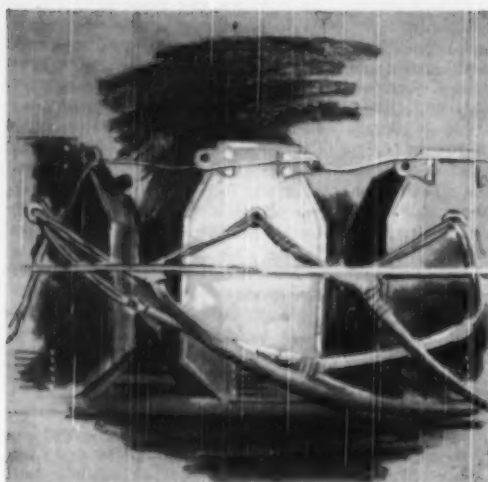
To shorten discharge time for shuttle cars and other equipment, chain or shaker-type feeding conveyors may be employed, with or without provisions for two-speed operation. In addition, the belt itself may be fitted with two-speed controls. Surge capacity in the belt system itself has been found a help by at least one all-belt operation. In this instance, a 300-ft chain conveyor with deep sideboards receives coal from several cross and developments units and feeds onto the main belt, the scheme resulting in even and maximum loading.

Control and Protection

Reflecting the growth in the use of belt conveyors and in the complexity of conveyor systems, control requirements have progressed from a simple manually operated starter to more comprehensive systems including part or all of the following: sequence control, remote control, slippage protection, emergency control, automatic operation, speed control, preferential feeding and coal spillage.

If men are carried on the belt, protection against their injury also must be provided. A pull cord stretched along the top the length of the conveyor permits any man encountering trouble to bring the belt to a halt from any point. It also protects the belt against roof falls. And to make sure that men are not carried beyond transfer or discharge points, either through accident, as a result of falling asleep, and so on, paddle, pull-cord or electric-eye arrangements actuated by the man's body may be employed. Two-speed motors or resistances heavy enough to be inserted in the armature motor may be used to reduce belt speed when transporting men.

The present trend, however, is toward simplification of controls, and this trend is expected to accelerate in the future. This calls for rotary or plugging switches or small generators operating directly off the tail of each belt, thus doing away with wiring from one control unit to another. And for emergency stopping and starting, in addition to the pull cord, the 3-v two-bare-wire system is finding increased use. The older two-bare-wire method provided emergency stopping only. With 3-v and small currents, the possibility of gas ignition is eliminated and the system is easy to insulate.



ACCELERATED USE OF AC and increasing installation of improved facilities for the protection of both men and machines against shorts and grounds are expected to mark developments in the use of electric power underground

Power—Today and Tomorrow

Tested Methods for the Present AC and DC in the Future New Power Sources and Systems

MECHANICAL MINING necessitates good power. Since good power is largely independent of natural conditions, making it good and thus insuring maximum efficiency and lowest cost is largely a matter of engineering at headquarters and management at the mine.

Low voltage and interruptions affect cost and efficiency from a number of angles:

1. Production drops as a result

of slower operation of equipment and more service interruptions.

2. Men working with bad power are not inclined to put forth their best efforts.

3. Breakdowns from overheated motors and auxiliary equipment cut output and increase maintenance cost.

4. Power cost is increased through waste of energy and prolonged demands.

What are the benefits of good power? Reported examples include the following: (1) same power bill now for two mines and, with the help of new cars, 300 to 400 tons more output; (2) power cost cut from 9 to 6¢ per ton in spite of full-scale washer in continuous six-day operation and heavy pumping load, largely by raising average voltage from 200 to a minimum of 230 at the machines; (3) reduction of 3½¢ per ton in maintenance and 2¢ per ton in power cost by raising voltage from 160 to 225 to 250 volts at the face. All these are full-mechanical mines with high-capacity loading machines and other equipment to match.

Tested Methods for Today

AC SERVICE

KEEPING SUBSTATIONS near the load center is always a good rule in efficient power distribution. It shortens the low-voltage lines, thus facilitating keeping voltage up and reducing line losses. With the higher peaks and increased average demand resulting from increased horsepower being built into new machines, such as the continuous miner, keeping substations close,

especially those directly serving the working sections, becomes even more important. This is because the increased demands necessitate closer voltage regulation, whether serving the units direct or serving rectifier or rotary-converter equipment supplying dc. Keeping substations close eases the problem of regulation while saving in copper for conductors.

Higher Voltages—While not as

yet widespread, there is a definite trend toward primary distribution at 4,000 or perhaps, in the not-too-distant future, 6,000 v. Conductor size, line losses and regulation are the major factors. Suitable taps facilitate regulation, and present-day thinking is to the effect that a fourth wire and grounded neutral is essential.

Central Metering—The cost savings made possible by purchasing in larger blocks, meaning metering at a central point, have been sufficient to warrant heavy invest-

ments in pole lines at a number of properties. Supplementing central metering with metering of individual circuit can provide valuable control information, facilitate the most efficient use of energy and insure better service.

Lightning Protection—Substations, large power transformers and large high-voltage motors should be equipped with the best available arresters in combination with small capacitors to prevent surge damage. To be effective, any arrester installation must have a reliable low-resistance to ground that is always damp or wet. Separate circuits to key installations are further insurance against production losses.

Ground Detection—Safety and low maintenance both are assured by installation of efficient ground-detection equipment, such as three voltmeters in star connection.

Power-Factor Correction—Reports of savings more than paying for the cost of capacitor installations in less than six months indicate the possibilities in maintaining good power factor. In addition to capacitors, correction also can be supplied by synchronous motors at key points. And the need for correction can be reduced by care in designing ac service systems—particularly matching motor size to load.

Safe Equipment—Non-inflammable coolants provide protection against fires through transformer failures underground and on the surface. Such coolants, however, can give off poison gas. Though space and cost, among other things, offer some handicap, this hazard can be eliminated by the installation of either the dry-type transformer or the completely enclosed transformer filled with inert gas. The latter also offers the advantages of trouble-free operation and practically no maintenance.

DC SERVICE

As with ac equipment, the No. 1 rule with dc units is keeping them close to the load centers. Again, the increased power requirements of such new equipment as the continuous miner has highlighted the importance of this step. Present opinion is that two continuous miners can be operated from one 300-kw substation with transmis-

sion distances and copper sizes as follows: 250 v and 500,000 cir. mils, 2,500 ft; 1,000,000 cir. mils, 5,000 ft. Naturally, if this maximum distance can be reduced, so much the better. Naturally, also, keeping substations close is facilitated by making them portable.

Conductor Capacity—Along with keeping substations close to the load centers, providing voltage at least equal to the nameplate rating also is a function of conductor capacity. Ample copper and a good return are the answers. Return capacity should match positive capacity, meaning that if the rail is not sufficient, auxiliary returns should be installed.

Trailing Cables—Cable conductor size should be ample to carry the current without excessive voltage drop. The installation should include fuse or circuit-breaker protection for both machine and operator. Modern distribution and junction boxes provide the necessary protection and facilitate service to face equipment. Present trends indicate that all section wiring will be of the packaged type. That is, all cables will be made up in standard lengths with plugs or receptacles or both put on at the factory or in the central shop. In addition, all trailing cables will be of the quick-change type, reducing splicing delays. Connection to the machine will be by permissible plug. With continuous mining machines, indications are that a spare cable will be advanced along with the unit.

With growing use of quick-change and sectionalized cables, the opportunity for real repairs and vulcanizing will be enhanced. Even now, for safety and increased production, the general rule is to remove a cable for shop attention and vulcanizing when not over six temporary splices have been made.

Voltage Checks—The only positive way of insuring that voltage is kept up to the required figure is regular checking with a meter. Portable meters may be used at

intervals by the electricians and, while the cost is considerably more, recording meters may be placed in critical or strategic spots for a visible record.

Circuit Separation—Rising demands for power at the face, with attendant increase in the problem of maintaining stable voltage, dictate separation of the face and haulage circuits for maximum efficiency. The circuits, however, may be served from the same substation.

Load Distribution—Where heavy haulage locomotives pass close to substations, installations of load distributors help prevent interruptions in power supply as a result of circuit-breaker outages.

Sectionalizing—For protection against fires and for better overall efficiency, sectionalizing of the dc system is essential. All trolley wire and feeder should be equipped with quick-break enclosed safety switches approximately every 1,000 ft. Among other things, they save time by quickly isolating a faulty run.

Automatic reclosing circuit breakers in main, branch and tie feeders provide maximum protection against fire hazards and annealing of wire and save production time for units in other sections that might otherwise be affected.

Automatic Operation—All substations should be completely automatic in view of the high cost of wages for attendants. But if attendants are required by local conditions, arrange to have them do other work, such as grinding bits, splicing cable, etc.

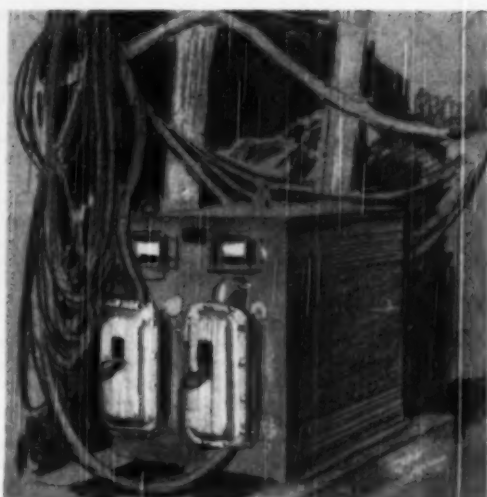
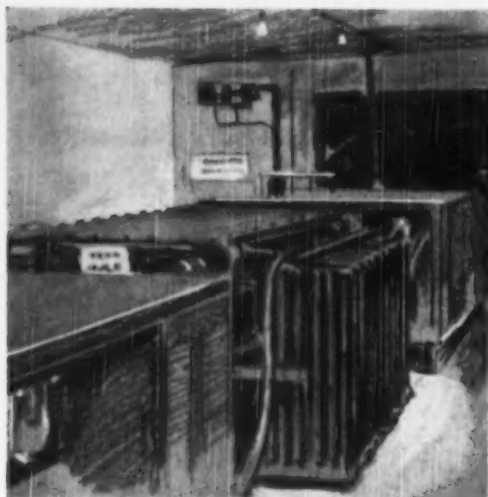
Safety—A solid ground from the machine frame is now accepted as the best method of preventing injuries and fatalities in the operation of electrically powered equipment. Personal safety can be combined with machine protection by using ground-trip relays to operate circuit breakers before major damage can occur.

Power in the Future

MORE POWER PER TON of coal will be the rule in the future. Different sources of power, such as the internal combustion engine, undoubtedly will come in in time

for locomotives and other mobile equipment. Electricity, however, will remain the major power source for quite a while at least, though there may be changes in the

NEW MINING HORIZONS—Power—Today and Tomorrow



MAKING CONVERSION UNITS PORTABLE is a major method of assuring good power at the face. New additions to the list of conversion equipment include the selenium rectifier (right), which already has found coal-mine application.

form in which it is used and also in the methods. Some of the developments actually in progress and others under consideration or being suggested are:

AC EXPANSION

Mining equipment powered by ac, some authorities hold, will come to the front very fast in mining—perhaps with 220-v motors at first to meet state and federal requirements and later with the motors rewound or reconnected for 440 when it is permitted at the face. In ac service, capacitors will be mounted on the machine or at the most will be no farther away than the end of the trailing cable. The use of three-phase transformers will increase on the surface and underground as improvements in design are made.

Ac-to-ac conversion is simpler, more efficient and cheaper, and the conversion units can be kept close to the load, thus favoring line regulation. From the safety standpoint, modern impedance neutral grounding is stated to be better than the best dc system. Over long distances, however, transmission is not as good as with dc and the dc mine motor normally is a sturdier, more trouble-free unit.

The motor of the future is envisioned as a burnout-proof machine with all-synthetic insulation, built-in thermal and overload protection and built-in starting equipment. And the growing use of con-

stant-speed motors with hydraulic operation favors the growth of ac, which permits use of simpler and cheaper motor types. Even where dc still is retained for traction purposes, the advantages of ac are such that dual systems are well worth consideration.

Hydraulic Power—In view of the problems of cable size and the like in serving the higher-horse-power machines of today and tomorrow, growing consideration is being given to designing them for hydraulic operation, with service from central pumping stations. This again would favor ac, in addition to simplifying power distribution and controls on machines, and enhancing safety by removing electricity from the face zone.

AC Traction—A major difficulty in expanding the use of ac power underground is the present need for dc for traction. When a change in the traction-power picture can be expected is difficult to state at this time. Some of the possibilities being considered or discussed are:

1. Battery power for traction equipment.

2. Engine - generator - battery combinations.

3. Ac traction motors. While presenting major difficulties in design and control, ac traction motors are not considered impossible and the claim is made that one type of motor already in existence quite likely could be adapted to shuttle-car

service without great difficulty.

4. Ac-hydraulic operation. For shuttle cars and similar equipment, it is considered quite feasible today to drive with hydraulic motors supplied from a pump operated by an ac motor.

DC SERVICE

Possibilities and proposals for the improvement of dc service to underground mining equipment include the following:

Better Batteries—Efforts to provide battery-operated shuttle cars with sufficient capacity to last two full shifts are reported to be meeting with some success. With charging on the third or idle shift, the number of batteries necessary for multiple-shift operation naturally is reduced.

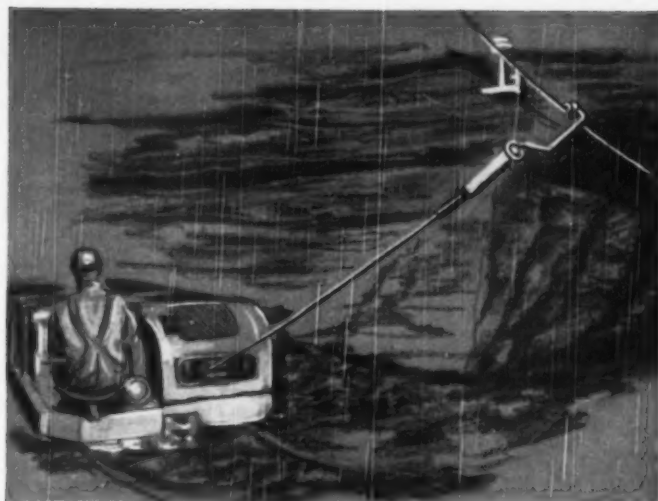
Engine-Battery Service—In addition to direct operation from diesel engines, now proposed particularly for main-line and relay locomotives, engine-generator-battery combinations are being suggested for shuttle cars, locomotives, tractors, timbering machines and other mobile equipment. The essential items are listed as follows:

1. An internal-combustion engine.

2. A dc generator—diverter-pole, regulated shunt-wound, etc.

3. A permanent storage battery.

4. Suitable control and protective elements (engine governor,



INVERTED TROLLEY—a new development in dc service—replaces poles and nips with sliding shoes for greater safety and efficiency with reduced maintenance.

overload and reverse-current generator protection, idling control for engine when battery reaches a specified state of charge, and so on).

5. Flame arresters, gas scrubbers, etc., for underground service.

With a shuttle car, for example, power ordinarily is supplied by a 48-cell two-tray battery with a capacity of 300 amp-hr and 28 kw-hr at a 6-hr rate. This battery would be replaced with a 48-cell battery of half the capacity on side of the shuttle car. In the space on the other side would be mounted a 5-kw 7½-hp engine-generator set able to produce, theoretically, 40 kw-hr of energy over an 8-hr shift.

Cars operated with two 5-hp motors normally draw peaks of 200 amp more or less; two 7½-hp motors, 300 amp. A 5-kw generator could furnish 40 to 50 amp when necessary. Normally, the generator would operate at full capacity, with the battery supplying excess demand and receiving charge when the load was reduced. The result would be continuous service without charging.

Inverted Trolley—Getting power from the trolley to locomotives and other mobile equipment has always been somewhat of a problem in mine operation. Improved shoe-type collectors, together with proper wire treatment, is a major help, particularly with heavy locomotives. Now, the inverted trolley with sliding shoe-type collector is offered as a substitute, with major

advantages reported from the initial installations.

In this system, the position of the clamp is reversed to put the wire on top instead of on the bottom. This, incidentally, makes it easier to keep the wire in the clamp. The conventional pole and collector is replaced with a sliding shoe which rides on the top of the wire. An arm is attached to one side of the shoe through a pin which permits the arm to swing one way or the other in accordance with the direction of travel. Below the arm is a fuse.

The connection between the shoe assembly and the locomotive, cutting machine, etc., is an ordinary trailing cable. In operation, the cable pulls the shoe along. Where gathering locomotives or other reel-equipped units leave the trolley, they merely turn off. The shoe remains on the wire and turns sideways in line with the cable pull. There is no need for putting down the pole and hooking on the usual nip.

Advantages claimed for the new system include the following: complete elimination of poles, reducing maintenance and promoting safety by eliminating pole breakage, back-polling, nipping and difficulties encountered in reversing poles in low top. No nipping means elimination of the possibility of eye injury and "paralyzed" arms as a result of holding heavy nips over long distances. Also, it means that nips cannot catch and pull men out of

locomotives, since the shoe is always free on the wire. Equipment maintenance, it also is stated, should be less, since there is no more breaking of contact with the controller wide open as in nipping, with consequent shock to motors, gears, and so on.

Three-Wire Service—Experience in a limited number of operations indicates substantial advantages in the maintenance of high face voltage with minimum use of copper through use of the three-wire Edison-type dc system.

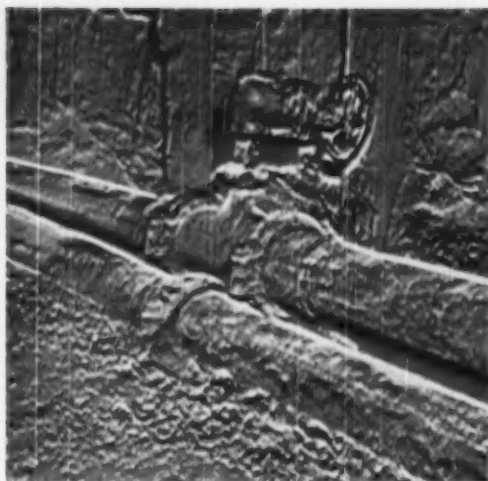
The following conditions are prerequisites for most advantageous use: (1) two generating units in series in the same substation; (2) moving of the substation close to the load center is considered impracticable; (3) two widely separated load centers fed from a junction, point several thousand feet from the substation; and (4) a high load factor, as in mechanical mining.

In one instance, a three-wire distribution system along a 4,800-ft haulageway between the substation and the circuit branching point reduced the voltage loss to 70% and the energy loss to about one-third that of the conventional two-wire system using the same copper. Two synchronous converters connected in series serve the system. The potential between the two insulated feeders leaving the substation is 600 v, one being 300 v above ground and the other 300 v below. The track or neutral conductor is connected to the tie line or bus between the two generators.

Distribution voltage to the loads is nominally 300. Since the voltage of the main circuit is double the face-distribution potential, a substantial saving in copper and I²R losses becomes possible. The third wire is called the neutral wire because it is grounded and therefore is at zero potential.

Conversion Possibilities—A recent addition to the list of ac-dc conversion units is the selenium rectifier, which, in small units, already has been applied in at least one mine for powering shuttle cars. Advantages claimed for the unit include low cost, high efficiency, simplicity and light weight.

A second possibility for conversion is the mechanical rectifier. This is a European suggestion now under discussion in the United States, since it appears to offer certain advantages compared to the standard unit.



SPEED COUPLINGS save labor in drainage and sprinkling service by promoting fast pipe installation.



ACID-RESISTING MATERIALS for pumps, fittings and pipe lines materially reduce maintenance cost.

Low-Cost Water-Handling

1. Preventing Water Inflow
2. Reducing Pumping Head
3. Conserving Manpower
4. Preventing Corrosion

WATER HANDLING is a necessary evil in coal mining and its complete elimination is of course a practical impossibility. But the magnitude of the problem may be reduced by a number of steps—mainly based on preventing inflow and using gravity for removal.

Preventing Inflow

Water that does not get into the mine does not have to be handled, saving equipment, power and labor. The possibilities can be gaged, among other ways, by determining the cost of keeping a pumper on the job for a full year. Normally, this is at least \$3,000. Methods of keeping water out of the workings include:

1. Ditches on the surface ahead of breaks; flumes of metal or wood across the breaks and other openings into the workings; dams and diversion ditches or flumes where streams are a problem.

2. Sealing of stream beds.

3. Grouting or chemical cementation of cracks and water-bearing

strata in the mine and in shafts, slopes and other openings where water inflow is encountered.

4. Sealing of worked-out sections.

And where pumping is required, investment, power, maintenance and labor costs may be reduced by such things as centralization of pumping, automatic controls, acid-resisting materials, reduction of friction head and the use of speed couplings and new pipe materials.

5. Emergency dams and storage areas to impound flood water for later convenient handling with reduced pumping equipment and reduced labor.

Gravity Handling

Making use of gravity is a second very-effective way of conserving manpower and reducing drainage cost. Means include:

1. Tunnels and drainways in rock or coal, either to the outside or to central locations where more-efficient handling of water is possible.

2. Ditches where they can be constructed. Ditches, where possible, should run to the outside and making special openings for this purpose may be worthwhile at many operations. Or, if ditches can be used for part of the distance inside, they save that much in pipe and friction head.

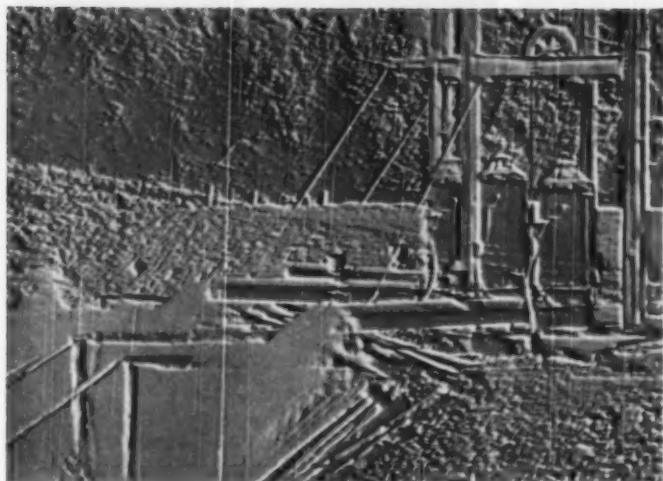
3. Boreholes through pillars, through outcrops, through rock inclined down to outfalls on the outside (or to central pumping stations inside), and from an upper to a lower seam save pumping equipment and pipe. Holes up to several hundred feet long are possible with relatively simple and inexpensive equipment, including the new big auger for large holes through coal.

4. Siphons—still a cheap and effective way of handling water without labor or power.

Reducing Head

Aside from labor, power is perhaps the most important factor in the cost of pumping. Head encountered in pumping includes, of course, both static, or vertical, and friction. The basic answers to the problem of reducing head include the following:

1. Surveying to find spots with thin cover and then putting in boreholes or other vertical openings to



MODERN PUMPING INSTALLATIONS cut cost through higher efficiency and automatic operation, in addition to permitting concentration of the pumping load.

cut the lift. If the area has been or is to be pillared, the deepwell turbine pump is a logical unit to use. Of course, as previously pointed out, horizontal or downward-dipping boreholes, drainways and ditches to outside openings, where possible, eliminate static head completely.

2. Installing pipe with a diameter ample for the job. Raising pipe size from 4 to 8 in., as an example, can, with a flow of 250 gpm in clean cast iron, reduce the friction head from 43.47 to 1.52 lb per 1,000 ft. The difference in power cost per year is \$500 or more per thousand feet.

3. Shortening the pumping distance. This can be done, as previously indicated, by vertical, horizontal or downward-dipping boreholes, and by tunnels, ditches and other types of drainways to outcrop openings or to large main collecting points underground.

4. Keeping pipe lines clean. Since deposits on the outside can cut pipe capacity as much as 50%, with accompanying increase in friction head, regular cleaning, where possible, is a step toward greater efficiency in water-handling.

Conserving Manpower

Aside from maintenance, which will be summarized in a later section of this article, the major opportunities for conserving labor in pumping and drainage, in addition to using gravity where possible, include the following:

Concentration — Concentrating pumping, thus eliminating a number of pumps and attendants in favor of a single and more-efficient station, is another economy step that may be taken at many mines. It involves the establishment of a central sump or sumps with the necessary feeders—gathering units, ditches and so on. Horsepower usually can be cut in half and labor as much as 75 to 80%. If sump capacity is sufficient, it may be possible to achieve additional economy by pumping during off-peak periods. Where the logical solution is to put sumps in areas that are or will be inaccessible, the deepwell turbine unit provides an efficient low-cost answer.

Automatic Controls — Pumping installations readily lend themselves to semi- or full-automatic operation, thus reducing attendance labor to the minimum necessary for inspection and lubrication. Full-automatic operation includes, of course, self-priming or provision for a constant positive head on the suction side. A positive head, in some instances, is secured by an automatically controlled auxiliary pump which serves as a primer and boosts suction-line pressure. Benefits include longer life for main-pump rotating unit and elimination of interruption as a result of suction difficulties, in addition to other operating advantages.

Float-control equipment now includes the relatively new electrode control for operation of the pump

in response to fluctuations in water level. Automatic suction valves also permit one pump to draw from several pumps, thus reducing the number of pumps and attendants.

Quick-Laying Pipe—New types of quick-make joints, as well as new types of pipe, offer material advantages in reducing pipelaying labor, particularly in such fields as sprinkling and gathering, where changes must be made almost daily. For metal pipe, the modern joint eliminates threads, permits a certain degree of angular misalignment and can be installed in a matter of minutes. It also facilitates the use of bent pipe and the salvage of older pipe on which the threads have been destroyed. New plastic pipes also feature quick coupling.

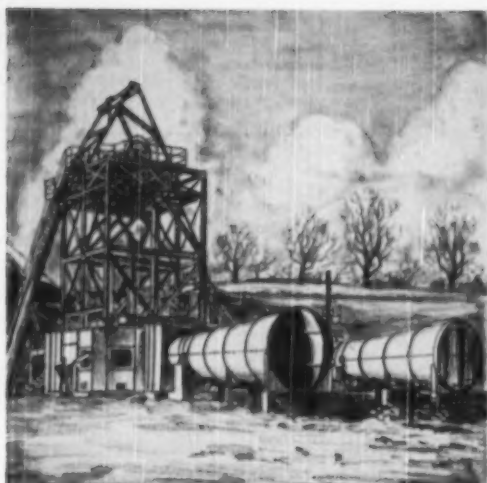
This feature of quick coupling with both metal and plastic pipe provides the further advantage that in case of a flood emergency, new pumps can be set and pipe laid fast.

Acid Resistance

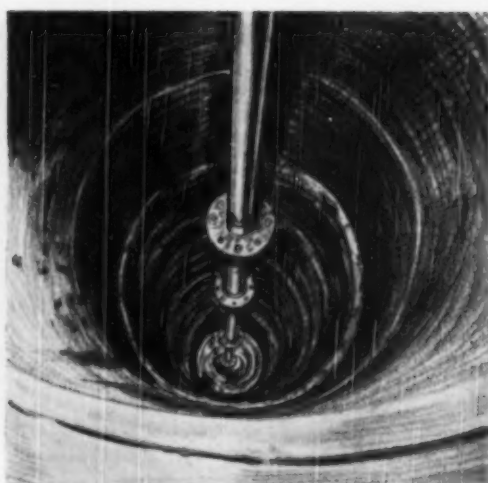
Forethought in providing proper materials for pumps, pipe and fittings can save coal-mining companies thousands of dollars annually in handling bad water. The savings result from decreased purchases of pump, pipe and fittings, and from a reduction in the labor required for repairing or replacing facilities, such as a long pipe line.

Pumps—Materials which may be used to materially lengthen pump life under acid conditions include: brass or bronze; chrome, manganese or other alloys; rubber, glass, porcelain, stainless steel and so on. Where case life might otherwise be a matter of months, if not days, use of these materials can lengthen it to years.

Pipe—Where acid water is encountered, the life of ordinary steel pipe may, as in pumps, be a matter of only months if not days. Long-lived substitutes include the new plastics, which also provide light weight and quick installation; cast iron, copper-bearing or other steel alloys, aluminum, wood, rubber, fiber, asbestos-cement, sewer tile, wrapped-and-lined steel; and cement-, lead-, rubber- and bituminous or plastic-lined steel. Lining materials and methods include salvaging of cast-iron sections by lining them with sections of asbestos-cement pipe, which then are grouted in place.



TWIN-PARALLEL FANS—modern and efficient in design—promote flexibility and facilitate low-cost idle-day service.



CORE DRILLING provides low-cost auxiliary openings for reducing ventilating cost by cutting air travel underground.

Air for Less Money

Modern Fans Operating at High Efficiency, Coupled With Ample Airways, One-Way Travel, Splitting, Leakage Reduction, Standby Drives and Positive Circulation, Provide Maximum Ventilating Results at Minimum Cost.

VENTILATION involves not only equipment and power but also labor. Consequently, it requires attention from all these standpoints, especially since air is a relatively costly ingredient at many mines. In other words, many operations spend two to three times the money actually necessary for good ventilation and at the same time suffer a reduction in efficiency through insufficient air at the working faces.

Excess cost grows primarily out of the operation of a few basic principles, including:

1. Quantity varies directly as the velocity.

2. Pressure, or water gage, varies as the square of the velocity.

3. Power varies as the cube of the velocity.

Briefly, the problem resolves itself into one of providing an efficient ventilating unit of the required characteristics and then getting the air to the working places with a minimum of loss and the lowest possible use of power. This involves shortening the air travel, decreasing resistance, providing ample airway area, proper splitting, eliminating leakage, sealing worked-out areas and other necessary steps.

Efficient Fans

Late-type fans, with few or no changes in mine conditions, often can cut power substantially, partly because of the inherently higher efficiency of the new units and partly because of a closer match to mine characteristics. In addition, late-

type fans also provide a wide range of capacities with approximately equal efficiency, which permits substantial changes in operating conditions without materially affecting operating cost. Quick blade adjustment facilitates easy adjustment to

meet changing operating conditions as mines develop.

Trends in fan design and application are marked by nearly opposite tendencies. On the one hand, there is increasing use of small units in multiple. In some instances, a separate opening, each with its own fan, is made for almost every working section. Installation of twin fans in parallel is growing. A major advantage is ability to shut one down on week ends and idle days to save power. With single fans, use of two-speed motors permits operating at reduced speed and volume but with some loss in efficiency. Nevertheless, the power savings in some instances reach 75%.

In the opposite direction, an increasing number of mines are going to higher-capacity fans operating at a higher water gage, reflecting the demand for more air underground and the increasing resistance encountered in the thinner seams. Offsetting this, the cost of power is coming down and therefore it is possible to use more in getting good ventilation. While the fans have a higher capacity, they are smaller and the higher pressures are being attained at a lower speed—within practical limits—thus reducing noise and strain. Pressures up to 10 in are being specified in some new installations.

Efficient Practices

Ample Airways—For the same quantity, increasing airway area decreases velocity proportionately and power in an even higher ratio, according to the governing formula. Thus, with two headings, the same air can be circulated with one-fourth the horsepower; three headings, one-ninth.

The same principle applies in keeping airways clean, free of obstructions and as straight and smooth as possible. One bad 90-deg turn, for example, can offer as much resistance as 250 ft of straight entry. The aim is to prevent turbulence, which wastes power. Cleaning is, of course, essential in preserving airway area and reducing velocity, friction and turbulence losses. It should be noted, however, that cleaning a regulated split is a waste of money as long as regulation is necessary. Also, other things being equal, the section having the highest velocity should have the first attention in a ventilation-improvement program.

One-Way Travel—Forcing air to return to the point where it enters the mine increases distance of travel up to double what it otherwise could be. The answer is openings toward the back of the property to cut travel distance. Such openings can save up to 80% in power by eliminating return airway length and leakage, doubling the number of airways available for a portion of the circuit, with consequent reduction in velocity, and, of course, cutting the travel distance.

Sealing is, in effect, another method of reducing air travel. Also, it can reduce the volume of gas that has to be handled.

Where the seam outcrops, establishing the auxiliary openings is a simple matter. Where the coal is deep, the big core drill can put down vertical openings at a cost as low as one-third or less that of a conventional shaft of the same area. Underground, the big auger can be used for cut-off holes through pillars. It apparently will be particularly advantageous in making crosscuts between gangways and airways in pitching coal.

Splitting—Proper splitting, in addition to conforming better with legislative and other safety standards, can save considerable money by reducing water gage and power for ventilation. Splitting, however, requires the use of regulators, and

cases sometimes arise where forcing enough air into one long split requires regulating the others to an extent materially increasing the horsepower. In such instances, an auxiliary fan in the long split may be cheaper in the long run by relieving the main fan of the load resulting from extra regulation. Where auxiliary fans are forbidden underground, it may be possible to install them at auxiliary openings on the surface.

There is a growing trend toward the use of separate splits for each working section. The cost of the necessary overcasts can be reduced by using corrugated metal tubes.

Leakage Reduction—Where air leakage is as much as 40%, the power loss is approximately 66%. In other words, if there was no leakage, the smaller volume required could be circulated with approximately 34% of the power required for the larger volume with leakage. This is a powerful argument for major attention to tight stoppings, elimination of doors, and so on.

For good concrete-block construction, leakage is placed by some authorities at 6 cfm per stopping, whereas the loss per rough-board stopping is 340 cfm. Loss per door is put at 3,000 to 4,000 cfm.

Use of a relatively impervious material is the first rule in preventing leakage at stoppings. However, temporary stoppings manifestly cannot be built the same as the permanent type. The answer is wood or recoverable block, supplemented

by sealing. Plaster is the old standby with temporary stoppings. A new medium for both temporary and permanent stoppings is fire-resistant paint or plastic.

Standby Drives—Since increased emphasis on safety now means that a fan stoppage normally requires removing the men from the mine, the answer is standby drives or even complete standby fans, particularly at large operations. Where single fans are installed, maximum protection is provided by automatic equipment for switching from the regular drive to a separate motor or internal-combustion engine. And where the problem is especially critical and electric service is preferred, separate power lines, transformers and starting equipment may be provided to reduce the possibility of interruptions from lighting or other line damage.

Conserving Manpower—Ventilation labor frequently is larger than would appear at first glance. Ways of reducing it include:

1. Adapting the mining plan and constructing auxiliary openings to promote one-way travel and reduce stoppings and overcasts.

2. Installing permanent timbering and lining in ventilating openings and constructing permanent trouble-free stoppings, to reduce clean-up labor and ventilating cost, cut the cost of maintaining ventilating facilities and decrease leakage.

3. Elimination of all possible doors to save construction and maintenance labor; use of automatic door-opening equipment to eliminate attendants.

Positive Circulation

The point where the air—and the expenditures for circulating it—are made effective is at the face. In other words, the goal is putting the air where the men work and where the gas, if any is present, is being released. Consequently, positive means must be provided for insuring that the air reaches the working faces.

As a result of safety requirements, the preferred method for positive circulation today is the brattice line.

Continuous miners have focussed new attention on ventilation at the face as a result of greater dust production and the possibility of an increased rate of methane emission. Improved spraying equipment helps

take care of the dust problem, but has no effect on the gas problem. Consequently, for better vision, more comfortable conditions for the operator and better removal of gas, the present trend is toward bringing the fresh air up the place and over the machine, and then returning it behind the brattice line.

Some ventilation men feel that even this is insufficient, pointing out that a zone 18 in to 2 ft from the face presents the major hazards and arguing that more-positive methods must be employed to get ample air into this zone. Permissible blowers, with sufficient power to direct a blast right against the face, are seen as perhaps the best answer.



WELL-EQUIPPED UNDERGROUND SHOPS staffed by trained men, supplied by adequate parts stocks and located close to the working sections insure a better maintenance job and reduce time lost in bringing machines in for repair and overhaul.

Modern Maintenance Methods

- | | |
|------------------------------|------------------------|
| 1. Organization and Manpower | 4. Overhaul Practice |
| 2. Inspection and Records | 5. Lubricating Methods |
| 3. Maintenance Facilities | 6. Modern Materials |

GOOD MAINTENANCE means more production per unit and a better cost through elimination of delays. If, as an example, delays were accounting for 6% of the available working time, cutting them to 1% would mean increasing the avail-

able working approximately 5%. In addition, the use of the best available materials—a major part of good maintenance—means a reduction in maintenance labor. Since, as previously outlined in this issue, maintenance is a major item in the

important field of service labor, progress in this direction has a vital effect on over-all efficiency.

Increased use of machinery underground and on the surface means a greater need for better maintenance, first, because the load is increased by the added number of units, and, second, because the results of breakdowns are much more serious. Good maintenance includes kinks and shortcuts as well as major organization and system. Some of the things that result in good maintenance are:

Organization and Manpower

While the need for good maintenance is the same, the type of organization necessarily will vary with the size of the operation and the quantity and type of equipment in service. In any event, however, the importance of maintenance should be recognized.

Among other things, the maintenance head should report to top management, rather than to the immediate production supervisor, though, in some instances, they would be one and the same man. Naturally, maintenance and operating men necessarily must work closely together, but giving main-

tenance a status of its own permits greater progress toward the desired goal.

Where possible, the maintenance head should have the advice of specialists in electricity, lubrication, shop practice, and so on. And he should be provided with the necessary clerical help, since keeping good records is a major key to lower maintenance costs.

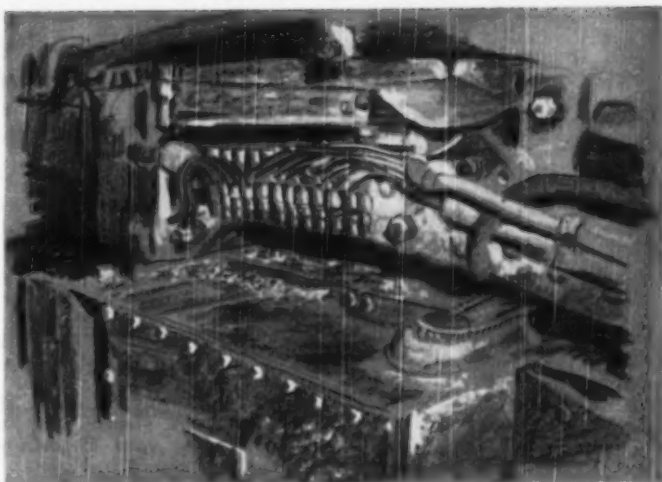
Maintenance Training—Since maintenance results reflect the skill and ability of the men doing the work, the best should be the rule. Normally, this means training on

the job both for new men and men already at work. Where the operation is large enough, special training schools or facilities have proved their worth in providing the necessary skills and toning up the maintenance operation in general. Even at small operations, individual attention by the maintenance supervisor or a qualified man already on the job can do much to give new men the right start. In addition, help can be obtained from extension classes, vocational-training schools and the service men of manufacturers.

Operator Training—Abuse of equipment is a major factor in running up maintenance cost. In many

instances, the abuse is the result of lack of knowledge. The answer is operator education in what abuse means and what should be done to prevent it. In addition, education can help an operator in picking up and reporting conditions that need attention, thus forestalling major breakdowns later. The foreman also should be schooled in preventive maintenance and also should be on the watch for conditions—both machine and otherwise—that might increase maintenance cost.

Manpower Distribution—Preventive work is the first step to low maintenance and the elimination of delays. Consequently, there is good reason for having maintenance men stationed in the working sections. Their duties naturally are inspection, adjustment and running repairs. They are backed up by the general staff, which has the primary job of overhaul and repairs.



GOOD LUBRICATION—by centralized equipment and otherwise—ranks high among maintenance musts for lower cost and higher tonnage.

Inspection and Records

Since knowledge of causes and delays and breakdowns is vital for their elimination, good records are essential. Methods vary, but a basic step is a report on loader or other equipment delays and their causes made out by the machine operator, the foreman, or the electrician or mechanic—sometimes by all three. From there on, the extent and type of records to be kept will vary. Normally, however, mines with good records usually are the mines that rank high in efficiency.

Equipment Inspection—Inspection is perhaps the first line of defense in efficient maintenance. This task should be assigned to men properly trained for the job, and they should follow a schedule set up on knowledge and corrected through experience. Inspection schedules naturally vary with mine conditions. Where electricians, mechan-

ics or repairmen are kept in the sections, inspection is daily or continuous. Many mines formally inspect at intervals varying from one week to two or three months. In addition to such regular inspections, check inspections are made by higher authorities or men from the central shop or general maintenance force at a number of properties. In some instances, the machines are brought to the shop for check inspections.

Variations in inspection procedure include the following:

1. Routine checks once a week and opening of cases once a month.
2. Routine once a week and movement to the shop once a month for more thorough inspection, bearing adjustment, etc.
3. Greasing of all anti-friction bearings every 10 days or so by an electrician, who inspects equipment thoroughly at the same time.
4. Special installation inspection

tions of electrical equipment, with approval by the electrician and the safety engineer.

Inspection by examination also is backed up by meters and recorders at some mines. Among other things, such equipment can show idle time on loaders, voltage conditions and increased load—possibly as a result of bearing trouble or faulty lubrication.

Mine Inspection—Several mining companies have extended the inspection principle on the theory that trouble can arise in mining practices as well as within the machine itself. Voltage checks, therefore, are regular practice at many mines. A number also check mine conditions and particularly face preparation because of its effect on maintenance as well as on production. Digging out a tight shot, as an example, takes time and is hard on the machine. Bad track, working in water and many other conditions are hard on both machines and tonnage.

Maintenance Facilities

Good shops and good shop equipment naturally are essential to achieving maximum results in maintenance. Some of the equipment items that experience has proved will get results in maintenance are listed elsewhere in this article.

A main shop is essential for major repairs, overhaul and rebuilding. Increasing experience, however, indicates that auxiliary shops near the working sections pay off in reduced maintenance cost and higher operating time, especially if machines must be moved long dis-

tances and hoisted to bring them to the central shop.

Practice at a number of mines is to locate a major shop—or perhaps two—with pits, overhead crane equipment and other facilities for handling heavy repairs—as near the working area underground as possible. In addition, at some operations, such shops are further supplemented by smaller shops—

25 Maintenance Manpower-Savers

1. Tool boards and tool sets to prevent loss and waste of time hunting for tools.
2. Special trucks and crates for transporting parts and subassemblies, with provision for sending along the necessary special tools.
3. Special wireman's and repairmen's trucks or cars with their own traction motors.
4. Welding equipment, welding trucks, and facilities for carrying off fumes and heat.
5. Automatic heads for tire and other heavy welding.
6. Metallizing equipment.
7. Cable vulcanizers with quick-action clamps.
8. Meters and electronic equipment for testing, including hook-on dc and ac ammeters, which obviate cutting insulation; oscillographs for ignition and other testing units.
9. Lever-type tools for straightening conveyor flights and hooking up flight and pan conveyors in place.
10. Insulation slitters and strippers.
11. Special tools and track-anchored equipment for straightening conveyor pans.
12. Steam or electric cleaners and solvent washers for machines and parts.
13. Floor anchors in shops for straightening cars with the help of a hoist or overhead crane.
14. Jigs for welding and machining work.
15. Impact wrenches, power threaders, power saws, rivet busters, etc.
16. Hoists over lathes and other machines for handling heavy parts; overhead or monorail cranes, hoists, etc., for moving heavy parts and equipment in shops and into and out of storage.
17. Fork trucks or other self-powered trucks or jeeps for moving parts and materials.
18. Piping of welding and cutting gases and welding current through shops, preparation plants and other buildings.
19. Heat-treating equipment.
20. Magnetic testing equipment for shafts and other parts.
21. Special trucks for hoisting loader heads and heavy assemblies or parts in shafts and slopes.
22. Special trucks for moving loading machines, cutters, shuttle cars and sub-assemblies.
23. Special power units for moving dead loaders and other equipment, such as a heavy coal drill specially fitted for application to the loader as an auxiliary power unit.
24. Air, hydraulic and mechanical presses, rollers, jacks, etc., for straightening, bending and similar work.
25. Gear and pinion pullers, dynamic balancers and so on.

perhaps with pits—in or near a section or group of sections to further reduce time loss in major repairs where rather extensive dismantling, welding, and the like are required. Such shops also may be used for light overhaul of such equipment as drills and of such sub-

assemblies as starters, contactors, and the like.

Special Shops—For certain items of equipment, special shops can be real money-savers at times. Car shops are an example, especially when equipped with the neces-

sary specialized tools, such as pneumatic wrenches, drills, and the like; and hoists, cranes and turntables. Drill and drill-steel, electric, hydraulic system, and the like, are other examples of specialized shops operated by various mining companies.

Overhaul Practice

Regular overhauling and keeping machines in condition with sub-assemblies reduce maintenance cost and increase unit working time. Spare equipment units are essential both for facilitating overhauls and for reducing tonnage losses from breakdowns. For maximum results, spare units should be spot-

ted close to the sections they are to serve and special equipment should be provided, if necessary, for quickly getting the dead machine out of the place after a breakdown and moving the new one in. This is viewed as particularly important where continuous miners are employed. In addition, of course, even

more emphasis on preventive maintenance is necessary with such equipment.

Time is the most frequently employed basis for overhauls. Usually, the interval between overhauls is fixed by the number of machines and shop facilities, which generally provides a 12- to 18-months' schedule. In other words, the routine at many mines is to pull a machine in as soon as the one in the shop is

ready to go back to work. Tonnage is the second basis for overhauling. In either case, a regular schedule, experience has shown, provides the best results.

Subassembly Overhauling—General overhauls requiring bringing the machine into the main shop frequently can be greatly reduced

in number by using the subassembly plan of overhaul. One or two loader heads, for example, may be kept on hand both as spares and for rotation on the producing units, cutting down the time otherwise required when the machine is taken out of service for complete overhaul and reconditioning in the shop. Indications are that subassembly

maintenance will show a major increase in the future, primarily as a result of the introduction of the continuous miner and the extension of mobile loading or mining to the thinner seams. The expectation is that subassemblies on new machines will be smaller and more numerous to permit ready installation, removal and handling.

Lubricating Methods

Improper or no lubrication and improper or poor lubricants mean excessive bearing wear. In turn, among other things, this means increased electrical maintenance because bearing failures in motors normally mean insulation, armature, coil and stator destruction.

Specification—Achieving results in lubrication starts with a study of the equipment in service and the types of lubricants that should be employed. Normally, the manufacturer's recommendations are a good guide. In addition, the service representatives of the oil companies normally stand ready to study the problems at a mine and make recommendations. Frequently, a careful study of requirements in relation to the types of lubricants necessary makes it possible to materially reduce the number purchased and used. The result is better lubrication with less labor and less expense for oil and grease. Occasionally also, by substituting a different type of bearing, such as graphite-bronze in the tail sections of conveyors, it is possible to eliminate lubrication completely.

Application—While machine operators still handle lubrication at

many mines, the trend is toward employing special men for this purpose or assigning the job to electricians or mechanics who have a more direct interest and a better knowledge of what needs to be done. Since minor repairing naturally goes with lubrication, it is logical for electricians, mechanics or other specialists to handle the problem.

Where specialists are employed, a growing number of properties provide special mobile lubricating units, which also are equipped to dispense hydraulic oil. Such equipment also facilitates making sure that each bearing is flushed as required for best results. Frequently, as previously indicated, the crews also inspect and make minor repairs, in addition to reporting on machine condition.

Centralized Lubrication—To eliminate the human element, save lubricating labor and insure adequate greasing of every bearing, centralized systems are being employed at an increasing number of operations, both in tipples and preparation plants and on such mobile equipment as cutters, loaders, and so on. Bearing failures, experience indicates, are reduced to practically zero.

Where centralized systems are not employed, or where auxiliary lubrication is necessary, special facilities for dispensing lubricants of the proper type and in the proper quantity are being found helpful at many mines. These special facilities, which also promote cleanliness and reduce the chances of contamination, include "grease bars" on each floor of preparation plants and the use of special containers holding only sufficient lubricant for the job, filled by the electricians or mechanics for later use by the operators. At one mine where the latter practice was adopted, armature failures on locomotives were cut substantially because the containers did not hold sufficient lubricant to permit flooding.

Records—Because of the importance of lubrication in reducing maintenance and loss of tonnage, a growing number of companies are adopting record systems. These show, among other things, quantity used per application, date of application and condition of fittings and bearings. Benefits include forestalling equipment failures because increased use of lubricant is a signal that the unit needs attention. Also, good records of lubricant use prevent waste and loss and permit a better approach to changes in types when necessary.

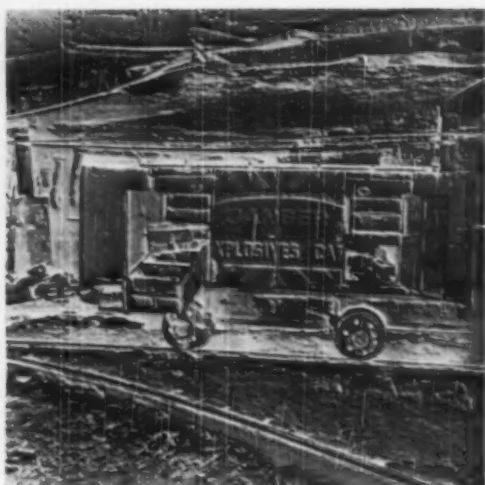
Modern Materials

If metals and other materials lasted indefinitely without attention, there would be no maintenance problem at mines. The fact is that they don't, but a conclusion that can be drawn is that the better the material used in the original machine or as a replacement, the less the maintenance required. A corollary is the use of parts that are better designed for the service, such as spline-type foot shafts on crawler loaders to reduce delays. Also, heat-treating increases toughness and resistance to breakage and wear, and hard-surfacing cuts wear

and lengthens life. And to eliminate excessive loads, with consequent increase in wear, such steps on setting clutches on loaders with ammeters can be taken.

Anything that resists heat, corrosion, abrasion, and the like, while providing the necessary strength and operating characteristics, also lessens the chances of machine breakdowns and decreases the time between overhauls and replacements. Aside from pumping and drainage applications, discussed elsewhere in this issue, possibilities include the following:

1. High-strength corrosion-resisting alloys for mine cars.
2. High-strength alloy shafts, axles and plates for mine cars and other equipment, both mobile and stationary.
3. Stainless steel and other special alloys and metals for screening and handling coal.
4. Wood, glass brick, tile and gunite for lining chutes, tanks, bins and other preparation-plant equipment.
5. Silicones, glass insulation, asbestos wire, high-temperature varnishes, hot-pressed mica slot troughs, asbestos varnished paper and other newer insulating products for electrical application.



PRODUCTION LOSSES ARE REDUCED and economical use of parts and materials is assured by keeping stocks close to the point of need and employing efficient distribution methods, including special cars and trucks.

Better Supply Service

★ What Efficient Supply Service Means

★ Low-Cost Receiving, Storing and Handling

★ Tested Distribution Methods and Equipment

NEXT TO LABOR, materials and supplies and their handling constitute the largest single item of expenditure in coal mining. In addition, lack of supplies at the point

of use—at the time they are needed—can cut production materially because of delays suffered while they are being hunted down and brought in. Thus, the difference between

mediocre and good supply service, aside from the cost of the materials, might be 1 or 2c per ton in handling only, while the cost in terms of waste and loss of tonnage might be 10c or more.

The question of supplies, therefore, goes well beyond that of getting them in, keeping records and getting them distributed, though even here there are opportunities for cutting cost.

On-the-Spot Stocks

When a machine is down waiting for a part, the crew's wages go on but production stops. This, therefore, is a powerful argument for having parts or subassemblies in or near the working sections. To

lack of parts and subassemblies might be added lack of timber, rails, ties, lubricants and many other items, including even lack of sand for locomotives or clay for stemming. Even if another man had to be added to assure delivery of supplies as needed, the net might

represent a handsome cost reduction.

Time and labor also are saved by maintaining the necessary parts stocks at shops in the mine and, in addition, on the surface, where the shops are some distance away from the supply house.

Reliable Records

As with about everything else, good records are a major step to economy in ordering and using supplies. Good records permit keeping the total investment in materials and supplies down, insure reordering in ample time and provide an opportunity for checking on possible waste and misuse.

The perpetual inventory is the

system used by most mining organizations in achieving the preceding and other objectives. Modern card systems facilitate operating the inventory scheme, since the data on hundreds and perhaps thousands of items can be kept in one small rack. On the other hand, a number of mines, to reduce the cost of keeping records, charge out supplies and materials as they are received.

Detailed records of where and

how supplies are used—by machines or working sections—necessarily add to the burden of record-keeping. Consequently, though such records permit close checks on waste and abuse of equipment, with consequent increase in parts consumption, it may not be worthwhile to keep them unless there is reason to believe that waste and abuse are taking an excessive toll of equipment and supplies.

Employee Education

Waste and misuse of materials and supplies, not to mention failure to requisition and use as necessary, usually is a result of lack of understanding, first, as to the cost of materials and supplies and, second, as to the effects of their lack on production. The answer is an

educational program for both men and supervisors. They should be told what things cost and how they can go about both conservation and salvage of all types of material used in the mine.

If salvage depots are established at strategic points or if a definite procedure is set up for recovering material and delivering it to col-

lection points, real savings frequently can be attained. In addition, special salvage crews have been found to pay at a number of operations. Frequently, these crews are supplied with special salvage trucks, timber pullers and other equipment for increasing the efficiency of the operation and reducing salvage time and labor.

Receiving and Storage

Modern facilities for receiving and storing materials and supplies, and for protecting them against weather and other damage or loss, assure efficient handling at a minimum cost. Steps that can be taken include the following:

1. Fireproof warehouses and outside sheds for protecting steel, timber and other materials and parts from the weather.

2. Truck- and railroad-car-height ramps for protecting heavy machinery and material; truck-, mine-car- and supply-car-height docks at supply houses for receiving and loading out parts and materials.

3. Convenient storage racks and

platforms for steel, timber and similar items, with monorail cranes, hoists, and other facilities for handling by power.

4. Provision for unloading timber trucks directly to mine cars or supply trucks to save rehandling.

5. Self-propelled cranes with grabs, buckets, magnets and slings for handling machinery, timber, steel, sand and scrap; also fork trucks and tractor-mounted loaders where they can be used.

6. Automatic or semi-automatic sand-drying equipment with conveyor, crane or gravity unloading and supply to the dryers, and gravity discharge to storage and locomotives, using boreholes, if necessary, to the underground. A further step being taken by a growing

number of mines is ordering pre-dried sand which requires only storage and distribution at the mine, thus reducing the cost of sand-handling labor and facilities.

7. Convenient ladders or stools for reaching bins in warehouses; shafts for cable reels to facilitate paying out and measuring cable.

8. Rotary or other special bins to facilitate handling small or other special items.

9. Portable or semi-portable supply houses where the plan of operation, such as contour mining, permits their use.

10. Oil houses with chain blocks, working-height racks and provisions for fast filling of containers or lubricating trucks.

Efficient Distribution

Getting parts, materials and supplies to the point of use efficiently and safely is the final step in supply service. Safety, in addition to efficiency, is an important consideration because supplies include both inflammable and explosive materials. Trained men are essential. Second is an efficient system for originating and processing requisitions to insure that supplies are ordered as needed and only in the quantities necessary, and that the orders are filled and the materials distributed promptly. Finally, labor is saved and efficiency is promoted by taking the necessary steps toward achieving good distribution. These include:

1. Specially designed supply cars and trucks to supplement what might be called the standard rail and timber trucks or cars. Some of these are: (a) enclosed and compartmented explosive and detonator cars, (b) lubricant cars, (c) ballast cars with provision for spreading the ballast at the point of use, (d) sand cars, (e) stemming cars, (f) subassembly and parts cars or trucks with tools as necessary. An

increase in the number of special cars or trucks naturally increases the chances of interference and complicates the problem of scheduling deliveries. However, within reason, special cars have proved to be worth while at many operations.

2. Battery-powered trucks or tractors pulling trailers for use in trackless sections, unless shuttle cars are available.

3. Reversing of conveyors to transport supplies into working sections and to working faces. Normally, to avoid interference with production, this means that delivery must take place on an off-shift, although it is possible to reverse room conveyors during the shift while cutting and drilling for a new cycle or, if loaders are employed, while the loader is working in the next place. With belts, also, special controls have been installed at some mines to provide the necessary close control and jogging required for unloading and for belt protection.

As a result of these and other considerations, main and mother belts frequently are paralleled by supply tracks, eliminating inter-

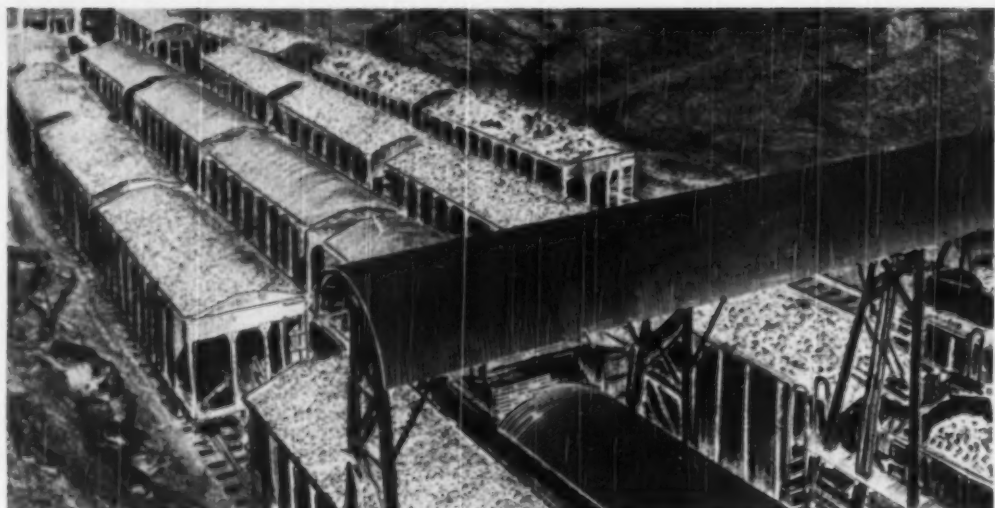
ference with production and promoting flexibility in supply delivery and general operation. Some operators have gone so far as to brush in low coal to get height for auxiliary supply tracks on the theory that such brushing is justified by higher efficiency in handling men and supplies and elimination of stoppages of the coal-hauling units.

4. Small hoists at the face, particularly in pitching coal, to pull in supplies.

5. Dollies for use in pan lines.

6. Special hoists, self-propelled pulling units, crawler- or rubber-tired low-pan trucks and auxiliary detachable wheels on drives for handling drives and pans in conveyor sections.

7. False pans for moving supplies to the face in room work. The false line is laid alongside the regular line. As the regular line is extended, the pan at the face end of the false line is unloaded and added to the regular line, and a new pan is added to the outby end of the false line and loaded with the supplies necessary for the next advance.



PRIME PREPARATION GOALS are low impurity content, precision sizing and uniformity, thereby enhancing coal's market position through greater economy and satisfaction in the end use of the product.

Quality Preparation

Preparation Preliminaries Coarse-Coal Cleaning Fine-Coal Cleaning

QUALITY is now more than ever a vital factor in a coal's market position. Good preparation therefore is essential. A well-prepared coal possesses, among others, the following major characteristics:

1. Low impurity content—as low as economically possible, considering cost of preparation and value to the consumer.
2. Correct size for the job.
3. A high degree of uniformity in both impurity content and size.

Additional desirable character-

Dewatering and Drying Sizing and Blending Refuse Disposal

istics are freedom from excess surface moisture, dust, tramp iron and other matter that might interfere with consumer satisfaction, plus surface treatment to keep down dust in handling and firing.

Along with providing these and other advantages, the preparation system should function with the minimum expenditure, for both facilities and manpower, and should recover the maximum possible tonnage of salable coal.

Full-seam mining and other changes increasing the percentage of rock in bituminous mine-run has complicated the preliminary crushing picture in bituminous. Again, crusher and breaker designers have come to the rescue with larger, higher-capacity equipment designed to insure satisfactory breaking of both coal and rock with a minimum production of fines. In addition to what might be called standard crushing units, the revolving-screen-type breaker has found increasing application in preliminary sizing. Where the rock or other impurities are sufficiently hard, this machine also provides preliminary removal of a substantial percentage of such impurities.

Blending—Aside from the convenience of having storage capacity ahead of the preparation facilities, blending bins are being installed in increasing numbers to improve cleaning results. Feeding a more-uniform raw coal results in a lower-ash, lower-sulphur, more-uniform product. The more-modern blend units provide for mixing not only in laying the coal in the several bins but also for additional mixing by controlled withdrawal through a number of feeders.

Preparation Preliminaries

Changes in mining practice, in preparation flowsheets and in consumer size preferences have greatly increased the importance of preparation preliminaries.

Mine-Run Breaking — Preliminary crushing or breaking is concerned largely with reducing the

top size with a minimum production of fines. New designs of crushers and breakers can reduce the production of fines as much as 50% or more, with consequent realization increase, in addition to simplifying preparation by reducing the quantity of fines to be washed, screened and dewatered.

Tramp-Iron Removal—Modern practice calls for removal of iron along with other inert or incombustible material to prevent damage to burning equipment and consequent consumer dissatisfaction. The major goal is keeping iron out of the shipped coal. However, iron also can cause trouble

with plant facilities, including screens, conveyors and cleaners. For this reason, a growing number of preparation men argue for removal before the coal enters the plant. Some back up the main removal equipment with auxiliary units for standby removal from the final prepared sizes.

Coarse-Coal Cleaning

Hand-Picking—A number of coals can be produced clean enough for market acceptance with perhaps only hand-picking of the larger sizes. And hand-picking still is the most practical method of cleaning coal larger than, say, 6 to 8 in, where appearance is a major factor. Among the answers to efficient picking with a minimum of manpower are:

1. Spreading the coal out and keeping the travel rate down to permit impurities to be seen and removed.

2. Designing tables so that the impurities can be slid rather than lifted off.

3. Providing good lighting.

Wet Cleaning—In the size ranges under 6 to 8 in and above the extreme fines, the mechanical cleaner normally provides impurity removal and uniformity impossible by any other method. Even with large lump, it occasionally is possible to wash at a considerable saving in picking labor. However, washing normally is less satisfactory above 6 to 8 in. Consequently little increase in usual top size is expected in the future.

Although there is growing evidence of a stronger challenge by dry equipment, jigs and upward-current washers lead the field in cleaning coarse coal—over $\frac{1}{4}$ or $\frac{3}{8}$ in. Launderers, trough washers, spiral concentrators, tables and heavy-media units round out the list. Use of the last two has increased substantially in late years for both coarse and fine sizes. A major characteristic of units using water alone has been ability to make a three-product separation: clean coal, refuse and middlings. This has been advantageous where cleaning is difficult.

Jig operation has been marked by improvements in design to permit treating a wider range of sizes and a trend toward reducing capacity per square foot of area. This latter is a result, among other things, of an increase in fines in

the average mine-run. Decreasing capacity per square foot and gentler pulsation enhances both the fine-coal-cleaning ability of the jig and its ability to provide good results on both ends where the feed range is wide.

Heavy-Media—Washing equipment using water alone—or water with certain types of media—depend partly or completely upon motion to induce an artificial gravity. New mediums, such as magnetite, permit a close approximation to true float-and-sink—a major reason for the rapid growth in heavy-media in recent years. Very recently, also, both the older as well as the new-type heavy- or dense-media equipment has been modified to permit a three-product separation, including middlings, thus increasing flexibility.

Because of precision results and ability to provide gravities materially higher than water alone, which gravities can be varied easily if desired, heavy-media progress is expected to accelerate. In addition to what might be termed the conventional vessels, the heavy-media principle also is used with jigs, the medium being provided in some instances by natural or crushed refuse or middlings. Heavy-media also is being extended to cyclone-type cleaners for the finer sizes, with good initial results reported.

Dry Cleaning—Because water complicates the problem of treating the finer sizes, and as a result of increases in efficiency and in top size that can be treated, a major growth in dry cleaning is pre-

dicted. Dry cleaners, it is stated, now can treat coal as coarse as 1 in, and new units include one that operates without either blowers or exhausters, materially reducing the dust-collecting problem.

Wide fluctuations in moisture—the bugaboo of the air cleaner—can be eliminated by predrying the feed. One advantage is that the quantity of water to be removed is much less than if the coal were wet-washed. Consequently, with improvements in the design and efficiency of air-cleaning equipment, a number of preparation men feel that the future will witness a major increase in air installations preceded by built-in predryers and followed, if necessary or desirable, by flotation or other equipment for reclaiming and cleaning the dust, which normally could be mixed back without raising moisture to an objectionable degree.

Increasing Recovery—With cost the vital factor that it is, loss of possible revenue through loss of salable material becomes even more serious. In other words, depending upon mine cost and realization figures, a reduction of 1% in coal recovery as a result of poor preparation can mean a loss of up to 10¢ per ton or more. If increasing recovery requires the purchase of additional facilities and the use of additional labor and materials, this extra cost naturally must be more than offset by the increased recovery. Among the roads to increased recovery, with or without additional investment, are:

1. Fine-coal reclamation (discussed in the following section).

2. Efficient operation and constant checking of cleaning units.

3. Crushing and retreatment of pickings and cleaner refuse.

4. Crushing and cleaning of mine rock to recover coal. Some mines have found that large investments have paid off handsomely.

5. Salvage and separate treatment—by crushing or otherwise—of bone and other low-grade material for customers with the facilities for using such fuel.

Fine-Coal Cleaning

Increased production at the mines and increased demand as a result of the development of new burning equipment, with the necessity for reducing stream pol-

lution as an added consideration, has brought the problem of beneficiating the extreme fines—less than $\frac{3}{8}$ or $\frac{1}{4}$ in down to 100 or 200 mesh—sharply to the fore in re-

NEW MINING HORIZONS—Quality Preparation

cent years. Equipment and methods include the following:

Launders—Long used for cleaning fines, launder equipment has been developed to treat very-large tonnages. Better feed and water distribution insure higher efficiency in separation and a cleaner coal. Launderers also may be operated to provide a middlings product.

Tables—The ability of the coal-washing table to operate with high efficiency on fines has resulted in a major increase in installations in recent years. Classification of feed prior to tabling normally improves capacity and efficiency. Where appreciable clay is present, desliming before tabling is often advantageous.

New hydraulic classifying equipment for preparing table feeds provides high capacity on coal up to $\frac{1}{4}$ in. in size. In multiple installations, it is stated, a clean refuse can be drawn off the front-end cells. Under certain conditions, also, the overflow may be considered as clean coal, the exception being where cleaning of the extreme fines—down to 325 mesh—is required.

For table cleaning also, a new revolving feed distributor permits diversion of one of the pulpstream fractions without disturbing the ratio of distribution for the remaining fractions.

Jigs—Although little used for fine-coal cleaning in the United States so far, the jig is the leading fine-coal unit in Europe. With only moderate changes in design and practice, some preparation men contend, it is possible to clean fine coal in jigs down to 80 mesh with high efficiency. With light loading,

the size can be dropped as low as 200 mesh.

Upward-Current Washers — A wide increase in the use of upward-current equipment, particularly in the anthracite region, has followed modifications in design to better adapt it to fine coal.

Flotation—Satisfactory results in what might be called the pioneer installations of the past few years presage a trend toward greatly increased use of flotation equipment in cleaning fine coal. In addition to the standard flotation cell modified for coal use, upward-current units are being converted to flotation units. The top size that can be treated is increasing. As an example, using kerosene as the reagent, one company is successfully cleaning up to 10 mesh. Flotation of centrifugal-dryer effluent is a new project now under development.

Cyclones—For thickening, for desliming, for the separation of silt and sand in cone cleaning, for other auxiliary uses, and for actual cleaning, the cyclone or cone cleaner is regarded as having a real future in the fine-coal field. Desliming facilitates drying. If the slimes are high in ash, a cleaning effect also results. This cleaning effect is enhanced if preceded by hydraulic classification, according to preliminary tests. With the introduction of a heavy medium, the cyclone definitely becomes a cleaner also.

Dry Cleaning—With predrying, and with treatment of the dust by flotation or otherwise, as outlined in the previous section, dry-cleaning of fines is expected to show a major increase in the future.

bination unit—relatively small in size—that will accomplish both washing and drying in one step.

Recent studies indicate that even bunker, pocket or pile drainage has advantages that may forecast wider use with fine coal. This results from the fact that drainage is fairly rapid and rather advanced in the upper zone. Consequently, by modifying storage facilities to permit removal and replacement of this upper zone at intervals, it appears that considerable drying help can be secured.

Mechanical Drying—Because it normally is cheaper, every effort should be made to exhaust the possibilities of mechanical drying before going to other methods. Equipment and materials now available or coming into use include:

1. Desliming units—Removal of material smaller than, say, 200 mesh, recent experience has shown, materially eases the problem of drying fine sizes. Therefore, desliming by hydraulic classification or the use of cyclone or other equipment is expected to increase.

2. Wetting agents—Compared to the possibility of desliming and centrifugal drying to such figures as 5% surface moisture for minus $\frac{1}{4}$ -in. coal, wetting agents offer the further possibility, as some preparation men see it, of getting the final moisture down to 3 or 4% in centrifugal dewatering. Cost is of course a factor.

3. Squeezing — Applying pressure to the coal, possibly in some form of screw conveyor, is regarded by some preparation men as a possible future drying method.

4. Dewatering screens—An old and satisfactory method of dewatering is the use of special screens of the high-speed shaker or vibrating types. Design improvements in recent years have increased dewatering ability to a point where low moistures are possible with even the finer sizes of, say, $\frac{1}{4}$ in. or less. The cost is about the minimum.

5. Centrifugal dryers—Centrifugal dryers presently available include the vertical unit with screen basket and the horizontal unit with solid bowl. On minus $\frac{1}{4}$ -in. coal, for example, modern types, including a new unit introduced from Europe, are reducing moisture from 25 to 30% to 5 to 7%, depending upon initial moisture and the percentage of fine material in the feed.

An apparent trend in centri-

Dewatering and Drying

The growth in washed-coal production has introduced not only the problems of added moisture but also difficulties in unloading and handling the coal not only in freezing weather but also where fines are involved at other times. Major attention therefore is being devoted both to drying methods and drying equipment.

Natural Drainage—Air drying or natural drainage, where it is possible to take advantage of it, naturally is the most inexpensive

way of removing water from coal. Theoretically, air-drying could be accomplished if the coal could be spread out thin enough and the necessary time allowed for evaporation. Drying space, time and handling cost, however, are major disadvantages. Consequently, the conclusion is that drying, where necessary, should be done in the regular flow of the product and by facilities with the capacity for completing the job in a minimum of time. For that reason, thought is being given to design of a com-

fugal drying is the operation of two units—for example, a low-speed rougher and a high-speed polisher—in tandem. Excellent results have been secured. A second combination is a vertical screen-type unit with horizontal polisher for the effluent. Efficient removal of the solids from the water facilitates operation with closed or nearly closed circuits.

6. Filters—Intensified work toward improving the capacity and efficiency of continuous drum and disk-type filters is expected to increase their use in the future, particularly when preceded by settling tanks or thickeners of various types, and possibly by classifying or desliming to reduce the percentage of very-fine material. Filter equipment also lends itself to the establishment of closed circuits.

Sizing and Blending

Crushing—With the rise in demand for industrial and domestic stoker, crushing of either mine-run or prepared sizes has become almost routine at bituminous preparation plants. But while crushing is essential for meeting market demands, the goal is breaking with a minimum loss of size value. This means a minimum of fines. Modern stoker crushers are meeting with real success in achieving this goal, and sizes and types being broadened to suit practically any capacity or coal. Where single-stage crushing is unsatisfactory for any reason, two-stage reduction, experience has shown, may be an answer.

Screening — Oversize in any grade of coal shipped is an indication that realization is suffering because a certain percentage of coal is being sold at less than the price it should be. Contrariwise, excessive fines may bring a sharp customer reaction. Good screening therefore is essential. It involves ample capacity and use of screen plates and cloths that insure precision sizing over long periods of time with a minimum of blinding and other difficulties.

With improvements in design, capacity and cloth, the vibrating screen has come more and more to the front. Radical changes in design are not expected, though there is a tendency to lengthen vibrators to get two products from

Thermal Drying—For the present, at least, heat drying is about the only efficient way of getting surface moisture down to 1 or 2% at a reasonable cost. New designs provide increased capacity and efficiency with a reduction in operating power and maintenance. New designs also go much farther toward satisfactory operation with very-fine material. As a consequence, it has been possible to recover and market silt and dust at a reasonable cost simply by the use of heat equipment.

To reduce the drying load, general practice today is to precede thermal equipment with preliminary dewatering units, such as screens, settling tanks, thickeners, centrifugal dryers, filters and so on, thus reducing the higher-cost heat cycle to the practical minimum limits.

one deck. In addition, intensified effort is being devoted to the problem of getting high capacity and precision results in fine-coal sizing—partly as a result of increased fines production in mining and partly because of the desire of the operator to increase recovery by reclaiming down to, say, 100 mesh without further cleaning by flotation or otherwise through removal of the high-ash extreme fines.

This means modifications in the standard vibrating screen, which modifications are under way. They include, among other things, use of light-weight high-strength corrosion-resisting materials which may reduce weight one-fifth or more, in addition to cutting horsepower and the size of the support-

ing structure. For screening proper, the need for a lower-cost material for corrosive or abrasive service is expected to be at least partly satisfied by the development of new alloys.

Blending—How far, in view of the fact that it costs money, a mine operator should go in mixing and blending is a question in part turning on market demands and competitive considerations. The trend, however, is toward more tailoring of sizes to meet specific requirements, since the result is increased consumer satisfaction. For that reason, large and comprehensive prescription-blending plants have been found a paying step at a growing number of operations, particularly where stoker sizes are involved. Such plants provide primary or primary and secondary crushing, bins for various fractions, and feeding equipment permitting precise control of the various sizes going into a finished shipment.

Dustproofing and freezeproofing are additional final treatments that promote consumer satisfaction not only at prescription plants but at others.

Preparation Control—Shipping a quality product uniform in character day after day requires accurate knowledge of the characteristics of both the raw coal and shipped product, and of the operation of the key units in the preparation system. Regular sampling for sink-and-float testing, screen testing and laboratory analyses therefore is a preparation essential. For critical sizes, automatic sampling equipment has been found by many users to promote accuracy with a minimum of sampling manpower.

Refuse Disposal

Where a part or all of the refuse cannot be converted into a useable product, such as slate blocks for stoppings, etc., the goal is to dispose of it as economically as possible. Motor trucks, larries and aerial tramways are the widest used media. An added starter, apparently destined for increasing use in the future, is crushing the refuse and pumping it away for convenient disposal.

Whatever the system employed, it should be as automatic as possible to conserve manpower. This

means among other things, motorized gates and feeders operated by pushbuttons or other automatic contacts, and the use of motorized track shifters and refuse spreaders on the dumps. If mobile equipment is employed, it also means using the largest-possible truck or larry to save operating labor. The degree to which automaticity may be carried is illustrated by certain belt-disposal units, which start and stop automatically through electric-eye controls actuated by changes in bin level.



SAFETY PROGRESS marks increased stress on the tested methods of the past plus such new ideas as roof-bolting.

Tested Safety Methods

1. Safety Organization

2. Education and Training

3. Safe Plant and Equipment

4. Safe Working Methods

SAFE WORK is efficient work. For that reason, if no other, safety is a No. 1 goal in coal mining. Major advances have been made and further progress will multiply the benefits from (a) a reduction in injuries and fatalities, in compensation and other accident costs, in loss of production and in damage to mine facilities; (b) higher efficiency and better employee and public relations.

Tested methods for achieving accelerated safety progress are:

1. Organization reinforced by management backing and employee cooperation.

2. Education and training.

3. Plant and equipment kept in the safest practicable operating condition.

4. Safe working practices backed up by logical working rules.

men, thereby avoiding a division of interest that might adversely affect safety work.

Whatever the form of organization selected, the active participation and backing of top management is essential. And because supervision has a direct effect on safety results, foremen must be included in the program and assigned definite responsibilities for the promotion of safety through on-the-job education and training, securing compliance with safety rules and working standards, and keeping working places and equipment in the safest-possible condition.

Organization for safety also includes setting up a record system that will show the number of injuries and fatalities and—more important—their causes. If the record system also shows the state of plant and equipment, thus revealing conditions that might cause accidents and permitting correction to forestall them, so much the better. Naturally, thorough investigation of each accident is the way to determination of the real causes and prevention of recurrence.

Safety Organization

While the organization plan for better safety naturally will vary, organization there must be for real results. A cardinal principle is assigning responsibility to some

one person. He may be the safety director or engineer, or the chief operating man on the job. Normally, the best results are attained by employing a special safety man or

Education and Training

Perhaps the first step toward greater safety is convincing the man that he can suffer injury or death unless he takes the proper precautions. The second is educating him to recognize dangerous conditions. The third is supplying him with the information and equipment necessary to avoid accidents. The fourth is training him in the application of this knowledge—in other words, developing safe habits.

While the man is the key figure in education and training, the supervisor is no less important, because if he knows his business the job of convincing the man and equipping him to do his part is rendered that much easier.

Miner Participation—All the safeguards in the world will not protect a man who, through ignorance or deliberate disregard of safety principles, invites injury or death. Miner participation in safety therefore is a must. And such participation should be positive and active rather than passive. Enlisting the interest and aid of the miner's family is an additional and effective method of stimulating participation.

Safety Promotion—Selling the safety idea and making it stick requires the regular consistent use of all the known promotional aids. These include word-of-mouth encouragement, publication of accident records and the reasons why accidents occurred, posters and bulletins, safety letters, safety magazines or mailing pieces, radio and so on, plus talks and discussions by company officials and outside authorities at employee get-togethers or other special times. In all this, the miner's family and the neighboring community should be additional targets.

Training—Know-how is a matter of education and training is one of the most-effective forms of education. Not only does it eliminate unsafe attitudes based on erroneous information or plain ignorance, it also, on the positive side, fosters correct working habits and creates safety consciousness. That was a major result of the first training in the field, which was first-aid and mine-rescue. Both of course, still are available and important. In addition,

special accident-prevention courses, for both men and supervisors are available from the USBM and other safety or training organizations. Where they are given, safety consciousness gets another boost, and both men and bosses get practical help in working safely and, as a result, efficiently.

Safety Codes—Special company or mine codes, pay off in the experience of a number of organizations that have established enviable records. Preparation of a company code, first of all, focusses attention on the safety problem and naturally, therefore, tends to strengthen safety work. Second, if supervisors and men have an active voice in development and revision of the code, they have a greater interest in seeing that it works. Developing a safety code

also provides a major opportunity for installing more-efficient production methods and getting them accepted.

Incentives—Extra money or prizes of some nature are major methods of getting men to put on a little more pressure in safety as in any other endeavor. Bonuses and prizes for both supervisors and men have been used with marked success by a number of companies. They are not, however, the only incentives. Another effective one is competition. Still another is praise for a job well done.

Therefore, even if money or other prizes are not offered, a safety program should include such incentives as posting of records by individuals and groups, the formation of honor clubs for safety champions, and various other methods of singling out achievements, such as, personal commendation, buttons and certificates, picnics and beer busts, etc.

Safe Plant and Equipment

A bad piece of track, a crystallized coupling link, a missing guard or any other failure to maintain plant and equipment in safe condition is an invitation to an accident. The answers are regular inspection, maintenance and repair, plus use of equipment that is built to the best safety standards.

Inspection—Perhaps the best type of inspection is that which results in regular written reports of machine and mine conditions and hazards found, with copies to top authority and also to the supervisors in charge of the sections or equipment found too hazardous. Then, if time limits are placed on removal of the hazards and provision is made for a report on such action, the scene is set for maximum progress.

Safe Equipment—Mining equipment that can ignite gas or dust, machines or electrical equipment that lack guards or grounding, cars that are old and in bad repair, are examples of equipment that can cause injury or death. Permissible equipment underground and enclosed equipment in dusty or other hazardous locations on the surface therefore is a good starting point in upgrading machine condition. Next, is good design, including proper guarding

and other details, such as automatic couplers on mine cars. Third, perhaps, is proper grounding of all electrical or electrically driven apparatus. Fourth is maintenance in first-class condition.

Safe equipment also includes the best in facilities for handling men. For that reason, special man-trip cars, and special safeguards for conveyor belts used for transporting men, have shown a major increase in late years. Going farther, many operators also have provided special elevator equipment or cars for handling men in shafts and slopes.

Safe Plant—Typical examples of measures that can be taken to assure maximum plant safety are:

1. Permanent roof support underground.
2. Ample clearances along haulageways; refuge holes.
3. Good track to prevent derailments; signals or other trip controls to prevent collisions.
4. Bridges or underpasses to keep men off haulways or roads; auxiliary escapeways; special headings to bleed off gas and dust.
5. Good lighting and good housekeeping.
6. Railings on stairways; good stairway treads and floor surfaces in surface plants, underground shops, mantrip stations, etc.

7. Fireproof substations, oil houses and so on, underground and on the surface.

8. Safe explosives storage facilities underground and on the surface.

9. Guards for bare wire.

10. Insulating mats or platforms in front of switchboards, switches, breakers, starters and the like.

Protection — To take care of emergencies that may still arise,

protective facilities are an essential part of a well-rounded safety program. For this reason, stationary and portable fire-fighting equipment, and special fire-line systems, are finding increasing use, and are being supplemented by sand and rock-dust stores at strategic points. Emergency and disaster facilities also include special cars and stores of parts and tools, such as brattice, sealing material, etc., for use as needed.

Fire Prevention—Tested methods of preventing fires include:

1. Use of fireproof materials in tipples, shops, supply houses, substations, stoppings, etc., underground and on the surface.

2. Good electrical equipment properly installed and protected by fuses, breakers and sectionalizing equipment, plus the best in trailing cables properly maintained.

3. Good housekeeping—keeping combustible materials cleared away, preventing dust accumulations, eliminating oil spillage, etc.

4. Proper equipment for transporting and storing flammable materials, and care in their use.

5. Elimination of smoking, open lights and all other sources of ignition.

Safe Working Methods

For maximum results, safe operating practices must round out organization, cooperation, training and measures to assure safe plant and equipment. In this, both management and men have vital roles, since neither can do the entire job.

Personal Protection — In addition to active work in other directions management and men have the responsibility of providing and using all possible protective equipment of a personal nature. The list includes safety hats, shoes, knee pads, gloves, goggles, respirators, self-rescuers, welding masks and so on.

Safe Practices—For their own protection and for the protection of their fellow workers, all mining men have the responsibility of obeying the rules and doing their job in a safe manner. Unsafe practices are legion. Examples are: reckless truck operation, carelessness in shooting, jumping on or off moving equipment, working on electrical equipment with the power on, horseplay, leaving ventilation doors open, working under bad top, etc., etc. The remedies are: (1) knowledge of what is safe and what is not, and (2) acting accordingly.

Roof Support—Falls of roof and rib still are the major causes of injuries and fatalities in coal mining. Tested methods for preventing them are:

1. Frequent, thorough inspection and sounding of the top. A prerequisite is training in sounding and interpretation.

2. Systematic timbering, including permanent support back of the working face, and safety posts, jacks and bars in the face zone. System is the real key, since, if properly set up, it automatically assures minimum support.

3. Taking down top that cannot be held safely.

New help in the battle against roof-fall accidents is being provided by the steel roof bolt or wooden pin, as well as by new mining equipment that reduces the exposed area and relieves the top of the strains of shooting. Because it practically guarantees good support under most conditions, clears the working area of posts and bars, tends to promote systematic and automatic installation, bids fair to be cheaper than conventional support, and offers substantial operating advantages, as pointed out elsewhere in this issue, the bolt or pin seems destined for almost universal use.

Progress in roof-bolting equipment includes the development of more-powerful and more-flexible drills to speed up the hole-making operation, improved nut-tightening equipment, development of combination outfits providing both drilling and fast pin-setting and tightening, lubrication methods for better tightening and stressing of the bolt, and special tools for quickly cutting off the projecting ends of bolts in thin coal. And not too improbable is the development of a bolt than can be drilled into place and set in one operation. Practical dust-collecting equipment for dry drilling also is well on the way.

Transportation—Haulage is the second largest cause of injuries and fatalities in mining. A major part of the answer, as noted elsewhere in this article, is safe haulage equipment and facilities. A second is care—safe speed, observance of signals and orders, caution in coupling where automatic equipment is not employed, and caution in getting on and off equipment, in riding belts and in other directions.

Explosion Prevention — An explosion requires gas or coal dust in the right concentration and a source of ignition. With this in mind, the obvious remedies include:

1. No smoking, open flames or lights, or arcs or sparks. This in turn means, among other things, permissible equipment and blasting materials or devices, approved cables, care in welding, etc.

2. Ample air at the working face, meaning positive direction. Under the safety code, this normally means brattice lines.

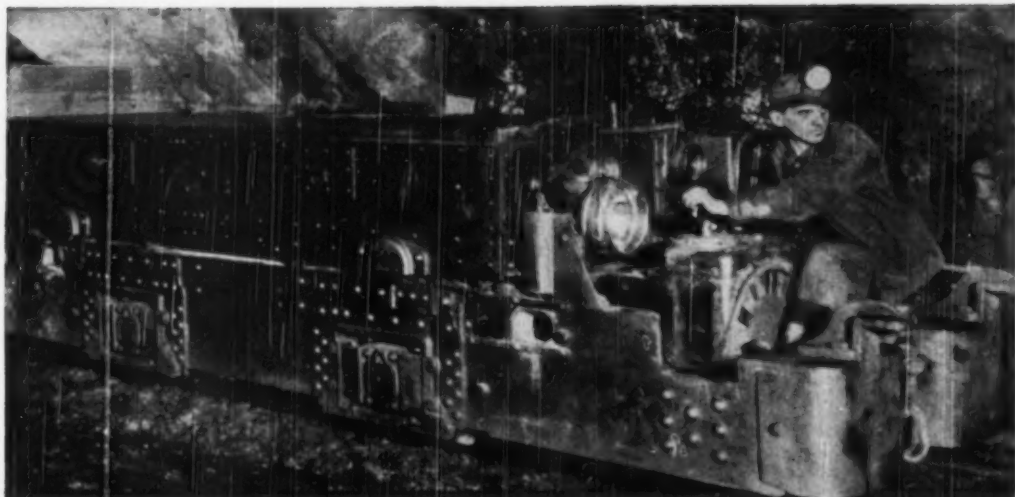
3. Efficient suppression and removal of coal dust. The best answer is water. Greater efficiency in killing dust is promised by new high-pressure spraying equipment and the use of wetting agents, which experience indicates also reduce the quantity of water necessary.

4. Rock-dusting and rock-dust barriers. Regular dusting prevents the starting of explosions, while barriers limit their spread in case one does start.

Electrical Safety—In addition to good equipment properly installed, steps toward improved electrical safety include:

1. Guarding of bare wires, use of mats or insulating platforms in front of switchboards, circuit breakers, starters and so on.

2. Grounding of all electrically operated equipment. In stripping, the best answers seem to be the neutral ground resistor for high voltage and the derived neutral for low voltage. In deep-mine dc service, the ground-trip relay and circuit breaker provide protection for both men and equipment.



Your haulage moves fast, and sure on **EXIDE-IRONCLAD POWER**

You get the kind of power with Exide-Ironclad Batteries which assures safe, flexible haulage operations . . . quick car changes . . . fast movements with fully loaded cars. Exide-Ironclad power is lasting power too . . . which keeps locomotives, trammers and shuttle cars working at steady, uniform speeds throughout the entire work shift. Moreover, power from Exide-Ironclad Batteries is dependable power, free from troubles which cause unscheduled periods of down-time for minor repairs which result in lower production per man, per shift.

The Exide-Ironclad Battery is *DIFFERENT* from all other batteries . . . different in design, construction and performance.

The main difference is the Exide-Ironclad positive plate which has proven its superior operating characteristics and its exceptional long-life in more than a hundred thousand heavy-duty jobs since 1910.

The operating and maintenance costs of an Exide-Ironclad Battery are extremely low . . . their serviceable life is exceptionally long. Combined, these important characteristics provide safe, dependable, full-shift power for haulage units, making Exide-Ironclad Batteries the best power buy—at any price.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto
"Exide-Ironclad" Reg. Trade-mark U. S. Pat. Off.

**SAFE
DEPENDABLE
POWER**



1888 . . . DEPENDABLE BATTERIES

FOR 62 YEARS . . . 1950



Foundation Blocks For Safety

Interested Bosses Promoting Employee Cooperation Can Secure Major Advantages for Their Company—Investigate These Employee Relations Tips That Highlight the Importance of the Man-to-Man Approach

By C. R. STAHL, Assistant to the Vice President, Eastern Gas & Fuel Associates, Mt. Hope, W. Va.

IT HAS BEEN APTLY SAID that every effective industrial safety program is reared on the same four foundation blocks:

1. The unqualified backing of top management.
2. A plant kept in the safest possible condition.
3. Safe working practices backed by logical working rules.
4. Employee cooperation.

Every man responsible for the success of a safety program wants and requires stout footing for his support. As Kipling's King Henry says of his Chair of State:

"I won't trust one leg, nor two, nor three.
To carry my weight when I sets me down,
I want all four of 'em under me—"

Although each of these four requirements is essential to the full success of a safety program they are self-evidently not of equal weight. Points 3 and 4 are certainly more important than the others. These are the points we are dealing with here. It will be found that the mines which come up again and again with commendable safety records do so because they know the immense value of securing the cooperation of their employees.

This may seem elementary but it was not always so. Turn over the pages of the old mining magazines of 35 and 40 yr ago and you will find that one of the dominant ideas of those days was the conviction that the rank and file miner was too ignorant to work safely and too foolhardy to want to. It was thought that since it was impossible, due to the nature of the

brute, to teach the miner safe working habits, the best that could be done was to encourage the formation of first-aid and rescue teams, so as to be able at least to pick up the pieces after the presumably inevitable had happened. We know better now, though the old philosophy still crops up now and then in an attenuated form among some of the more cynical members of our fraternity after an encounter with some hard-headed individual at the face.

The Foreman Is the Indispensable Agent—Safety engineers will be the first to acknowledge that foremen are indispensable agents in any safety program. This is because foremen are the only representatives of the company who come into close and constant contact with the great body of workmen whose cooperation is vital to the effectiveness of that program. Thus through this constant contact the foreman can be either a highly efficient transmission belt for safety principles and practices or an equally effective dam against their propagation. There is no need to labor the point that on the operating level he is at once the best salesman and the most vigilant watchman for safety that we have.

That being so, and assuming that our foremen have been properly sold on safety themselves, let us go on to something equally important—how to gain through these foremen the confidence and cooperation of the men.

No foreman can long secure cooperation from his men unless he has an honest interest in them. However, a sincere desire on the part of the foreman is not enough. He must either know or be trained how to pull, not push; to encourage, not threaten; to lead, not drive.

All too few supervisors know these techniques. Therefore they should be trained. Labor unions know how to



AS HEAD OF EG&FA's well-organized accident-prevention department, Major Stahl draws on wide experience to discuss the foreman's safety job. The NCA recently cited 347 EG&FA foremen for 1 to 20 yr of supervising accident-free crews.

train men in these techniques. Why should not management be equally alert to the necessity, and develop the techniques essential to a sound training program?

Winning Employee Cooperation—Next, what is employee cooperation, and how shall we attain it?

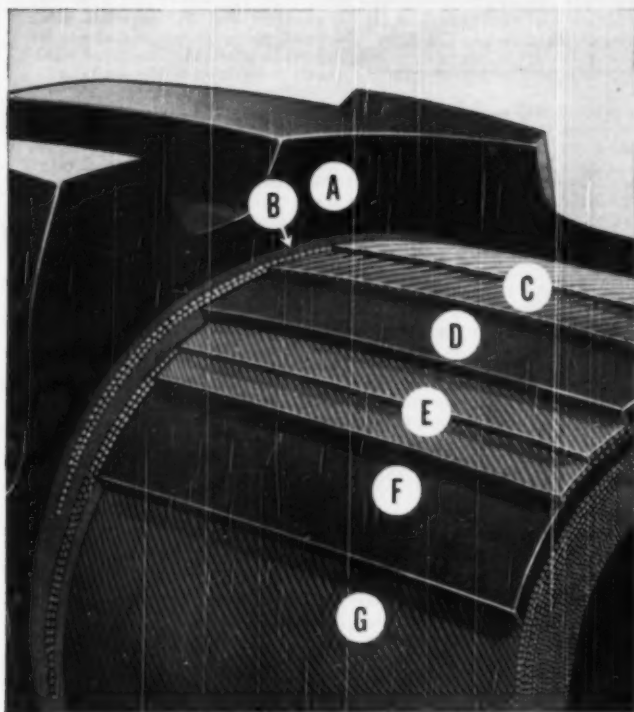
Two mastiffs can harass a lion and three can kill him, said the ancients. This was one type of cooperation. Old Plainsmen say that a coyote working alone cannot catch a jackrabbit, but two, working together, can.

Desirable as is cooperation, it is no simple matter to implant a cooperative spirit among a group of men. It is a complicated problem in human relations, in which we have as many variables as we have members in the group. All the variables must be evaluated and equated with some approach to accuracy if we are to obtain successful results. Our hypothesis concerning the individual is: All men are not alike but instead all men are different. Any group of men is a composite of many mental and physical factors—nationality, education, family life, health, physical ability, mental quickness, age, disposition, past experience and many more. If the boss handles five men, or ten men, or a hundred men, the problem is still that of dealing with men who are not all alike but who are all different.

Granted that in dealing with the

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B.F. Goodrich



Cross-section view of Universal Silvermine shows double nylon shock shield. (A) Extra-thick, cut-resistant tread rubber. (B) Cushion strip. (C) Top layer of nylon shock shield. (D) Heavy cushion strip. (E) Lower layer of nylon shock shield. (F) Heavy cushion strip. (G) All-nylon cord body.



Universals at work in a coal mine. Note husky, wedge-shaped cleats. Tire is non-directional, may be mounted either way on any wheel . . . cuts tire inventory!



WANTED: Maximum traction — Here, BFG coal mine tires move 65-ton loads through soggy going. Specially designed tread also helps prevent sideslip.

Nylon shock shield — the reason only BFG can give you more tire per dollar!

COAL MINING jobs are tough on tires. But the tougher the job, the higher the praise for B.F. Goodrich mine tires. BFG tires chalk up performance records because of special, exclusive construction features.

The nylon shock shield, for example — strong, elastic nylon (see illustration above) absorbs and distributes impact, protects the rayon cord body. Nylon shock shields are built into all BFG coal mine tires and double nylon shock shields in all tires, size 12.00 and larger. And only B.F. Goodrich gives you this added protection, the added savings of (1) longer tire life (2) more recappable

tires (3) greater bruise resistance (4) less chance of tread separation.

Also, BFG puts nylon to work for mine operators in additional ways. In large size tires which may require even greater protection on extremely tough jobs . . . All-Nylon construction is used. To the operator, the All-Nylon tire is a case of "paying a little more for a lot more" for consider this: in all tests not a single All-Nylon tire blew out, not one flex break occurred!

For complete details on BFG mine tires call your local dealer or write direct: The B.F. Goodrich Company, Akron, Ohio.



individual, different methods of approach have to be used for different individuals, there are ways of securing cooperation by methods or procedures which affect the group as a whole. Great characters in history knew this. An illustration lies in the fact that the soldiers of Napoleon were intensely loyal because he often took advantage of this trait of human nature. Through his military secretary he would inquire of the colonel of the Regiment of the Division if there were among his men any who had served in the old Army of Italy. If there were he took careful note of their names and before his next review of that regiment he would have them pointed out to him. Striding along before the ranks he would suddenly halt before some flabbergasted old soldier.

"Are you not Jean Duval of the Regiment of Lyons?"

The weather-beaten veteran would diffidently admit that he was.

"And did I not see you when we beat the Austrians at Marengo?"

Jean Duval could hardly deny that it might have happened. Then after extolling him proudly as an "old moustache" and a hero of the campaign of 1800, the emperor would pin upon him, then and there, the Cross of the Legion of Honor.

You may laugh at that performance, but it got results. A dozen or so such performances and you see a legend manufactured—the legend that the Emperor never forgot his old soldiers. So simple are the means by which dynasties are founded.

But it was not only by such tactics that Napoleon was able to gain the undying loyalty of his soldiers. His first act when he went to Italy to head the dispirited army opposing the Austrians was to make a speech to his soldiers. Throughout his career his leadership through the spoken and written word enabled him to bring into play his military ability and overrun the greater part of Europe.

What Group Cooperation Can Do— Referring back to the question of what can be done by the use of policies which appeal to the group, and which have no direct relation to discipline, as such, we cite just a few examples.

One illustration lies in the administration of the old-style burial fund. Very seldom indeed was a man found who would not willingly subscribe to such a fund.

A more recent illustration is shown by the example of one mine which, by cooperation among hospital, doctor, Red Cross, company management and employees, instituted a plan of blood typing every man on the payroll. The advantages were so obvious when explained to the men that 100% cooperation was obtained.

We are told that experience with this blood typing has been such that all the men at the mine are thoroughly sold on it. The next step will probably be to have blood banks kept

In Foremen's Forum Next Month . . .

FIVE MINE BOSSES will tell you how they converted unsafe workers into safe and dependable men through personal approach and sincerity in spreading the safety message. You will find their experiences and methods valuable for your own use.

at the mine, as well as in the hospital, so that blood transfusions for shock can be given immediately after an injured man is brought from the mine.

Another illustration of such cooperation lies in the fact that a few mines have accomplished the goal of having every employee connected with the production of coal, officials and workmen alike, take the 40-hr course in mine safety ably taught by safety instructors of the Bureau of Mines.

Using the Man-to-Man Approach— In all the foregoing we do not wish to create the impression that because this discussion deals principally with action appealing to the group that the personal man-to-man equation is not important.

One step in this connection is to avoid the detestable American habit

of addressing everyone as "Mack" or "Joe." On the other hand, there is hardly any more effective means of promoting goodwill between a foreman and his men than to greet them individually by name. If he knows their nicknames, so much the better. A man's name is what distinguishes him from his fellows and it is only human for him to appreciate being singled out by means of it. Note the reference previously made to Napoleon's recognition of the individual.

Nothing sours a supervisor's relations with his men more surely than a show of favoritism. Reward for merit is deserved, but more reward to one man than to another, for equal merit, stirs dissension and makes bad feeling. Likewise, to penalize one man while another guilty of the same offense is excused will break down all discipline. A supervisor loses the respect of his men if he is not consistent in his dealings. Over-familiarity with some and personal coldness to others is another factor that breeds factionalism and destroys teamwork.

Accident prevention through proper application of a knowledge of the human equation is hardly a program that can be applied; rather it has to be lived. Untiring and continuous effort is a necessity.

Get Your Men Thinking

YOU CAN BE SURE your men are interested in their work when they suggest better ways of doing things. On the other hand, when they freeze up and no response is forthcoming, are you prone to accuse them of lack of interest? Making that accusation and letting the matter drop there is the easy way out, but let's look at another approach that can return definite benefits in worker-response at the cost of a few minutes of your time.

No man can offer a solution if he does not recognize the problem, and similarly, he cannot suggest an improvement in operating practices if he is not aware of the difficulties that are so familiar to you.

Try this experiment. Study your men and pick one who never seems to come up with an idea. He will be the one who does only what you tell him to do, and not one bit more. He isn't critical of your methods and doesn't resent your supervision, so you can be reasonably certain that his attitude is a result of lack of interest.

Spend a few minutes with him at his working place tomorrow, and in a conversational manner ask him questions about his job. Let him tell you about his work. Then ask him some questions that perhaps he can't answer. Now you tell him some of the things about his job that he doesn't know. Have these questions ready before you meet him. If you

have any particular problems along his line of work tell him about those difficulties, and then leave him to his thoughts.

His interest will revive when he discovers that his job is not as routine as he thought—you told him some things he didn't know. Also, you outlined some problems and he will think about those problems. Work on him for a while and you can be certain that he soon will make suggestions, and some of them will be valuable.

To illustrate your responsibility, assume that a new man reports to you for his first shift as a mine-worker. You can initiate him in either of two ways: (1) you can tell him where to work and caution him to work safely—nothing more, or (2) you can tell him his duties, familiarize him with mine law, outline the hazards he should avoid, place him with experienced men who will take an interest in him, and then give him some personal attention until he makes the team.

Obviously, the second method is the one you would use, because the odds are against him if you proceed any other way. He wants to avoid injury but he might not if you and his buddies don't help him to recognize the hazards.

So it is with this matter of job interest. You can invite suggestions but you probably won't get many unless you also present some problems.

Announcing the NEW JENKINS **SWINGTITE**

with an exclusive new design
that assures smooth action,
positive closure, and longer life

In the new Jenkins SWINGTITE Fast-Action Bronze Gate Valve, the exclusive rolling disc and guide track design lengthens valve life and assures maximum tightness as it prevents uneven wear of seating surfaces. As the valve is opened or closed, guide rims around the seating surfaces of discs roll freely over guide tracks cast in the body, distributing wear evenly, dislodging foreign matter, and providing a polishing action for seating surfaces.

The SWINGTITE can be opened or closed instantaneously and easily with less than a quarter turn of the malleable iron lever which activates the self-adjusting ball and socket type double disc.

Wherever full, free flow is essential . . . where valve opening or closing must be instantaneous . . . you will see more and more Jenkins SWINGTITE Bronze Gate Valves setting new standards of performance and endurance. They are recommended especially for such services as laundry machinery, dish-washing equipment, gasoline and fuel oil lines, fire extinguishing steam lines in kitchens, and dispensing lines to tanks or vats.

Get all the facts on the new Jenkins SWINGTITE. Find out how much smoother-operating, how much *longer-lasting* these fast-action Bronze Gate Valves can be when Jenkins builds them. Send for the new folder, Form No. 196, containing full details. Jenkins Bros., 100 Park Avenue, New York 17, N.Y. Jenkins Bros., Ltd., Montreal.

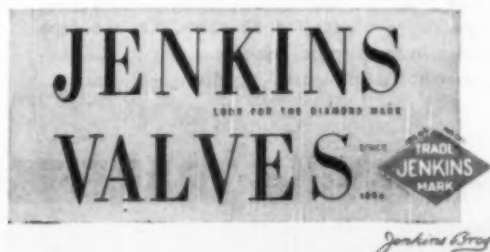
Sold through leading Industrial Distributors



**NO OTHER VALVE
of its type
HAS THIS FEATURE**

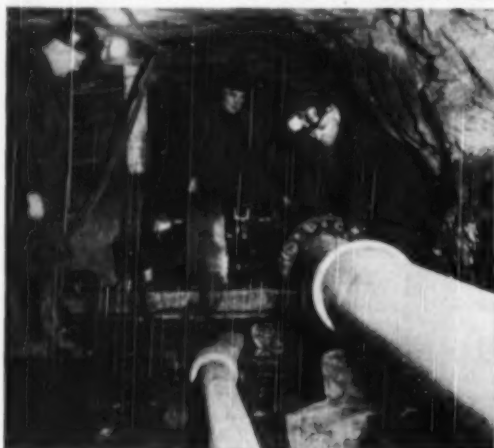


Notice the guide rims (A) of the discs which rotate freely on the guide tracks (B) cast in the body, as the valve opens or closes. This roller action provides a self-cleaning and polishing effect, and also distributes the wear, since the seating position of the discs changes with each closing. Rapid, uneven wear is prevented, and continuous tight closure assured.



Service records
 prove that
TRANSITE PIPE
 meets the "Acid Test"
 of corrosive
 mine waters

Year after year!

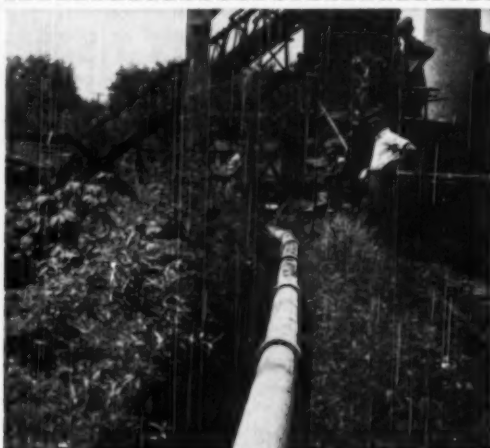


16 years at work for the Hudson Coal Company, Scranton, Pa.—yet this original installation of Transite Mine Service Pipe is still draining corrosive waters. More than 30,000 feet of Transite Pipe are in use in this company's various mines.

*Transite is a Johns-Manville registered trade mark



16 years on the job and going strong! This 36" Transite* line has been carrying corrosive mine water in the Truesdale Colliery of the Glen Alden Coal Company since 1934. Its present condition indicates that it will serve for many years more.



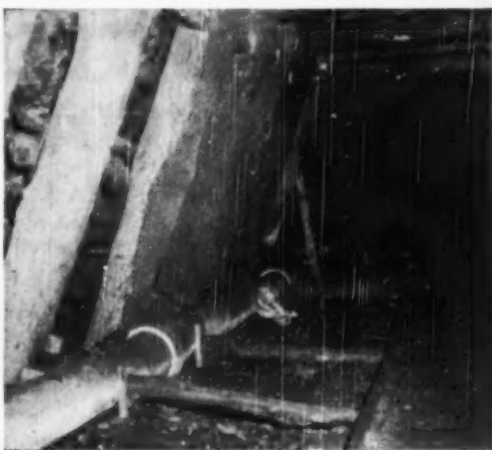
12 years and ready for more! When this West Virginia mine was abandoned, the Transite drainage line had been carrying corrosive waters for 12 years. Yet the pipe was in such good condition that it was disassembled and stored for future use!



Johns-Manville TRANSITE



10 years of service in three mines! That's the unusual record of this Transite drainage line, shown above in use in the Maiden Mine of the Kelly's Creek Colliery Company, Maidsville, West Va., after it had been moved there from another mine.



15 years on an acid water "diet" is the record of this Transite drainage line in the Packer #2 mine of Weston-Dodson Coal Company, Lost Creek, Pa. The pipe has constantly carried corrosive waters during its many years of service.

Mine Service Pipe

Here's why TRANSITE is the money-saving pipe for these coal mine services:

Drainage Lines, Water Supply Lines, Fire Lines, Bore Holes, etc.

✓ **High corrosion-resistance:** That's the secret of Transite's ability to outlast other types of pipe in tough coal mine service. Made of asbestos and cement and steam cured under pressure by a special Johns-Manville process, Transite Mine Service Pipe resists corrosion inside, outside and all the way through!

✓ **Tough, strong, durable:** Transite Mine Service Pipe is made to meet the exacting demands of mine service. Formed under tremendous pressure, it is exceptionally tough and strong—yet light in weight, easy to handle.

✓ **Economical to install:** Its special factory-made Simplex Couplings make Transite Mine Service Pipe easy and economical to install. Consisting only of a Transite sleeve and two rubber rings, this "packaged" joint is quickly assembled in restricted mine passages. No heating equipment or hot compounds are necessary. No special skill is required to make a tight, lasting joint.

✓ **Tight, yet Flexible Joints:** Joint flexibility is another advantage of Transite Mine Service Pipe that cuts installation costs. Designed to resist vibration, the Simplex Coupling can be deflected as much as 5° to permit laying the pipe around curves and in uneven, sharply graded passages without the use of special fittings.

✓ **Easy to re-locate:** Because of its exceptionally long service, mine operators frequently salvage Transite Pipe when re-locating their mine drainage lines. The relatively light weight of the pipe simplifies handling.

✓ **Each length factory-tested:** Before shipment, each length of Transite Mine Service Pipe, as well as each Simplex Coupling, is tested at four times its specified working pressure. Such careful testing assures a product of uniform high quality and is a major contributing factor to the impressive performance records which this pipe has established in mine service.

✓ **Sizes and pressure classes:** Transite Mine Service Pipe is available in diameters 4" to 36" and for working pressures up to 150 lbs. per sq. in. Standard lengths are 13' for all sizes.

For further facts, send for
your copy of Brochure TR-51A.
Use the handy coupon below.



Johns-Manville
Box 290, New York 16, N. Y.

Send me, without obligation, Brochure TR-51A about Transite Mine Service Pipe.

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Company

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LOCATED SERVE THE COAL

Ashland's refineries are in or near the great coal-mining districts. So Ashland petroleum products move quickly to hundreds of distributing points and terminals where they are ready to work for you.

PERMATREAT COAL SPRAY is being used by progressive mines in every area. Easily applied, it is a most effective dust-control and freeze-proofing agent. Together with proper washing and preparation, PERMATREAT is helping provide a better-selling coal, giving the consumer a clean, dust-proof coal that is competitive with other fuels.

Ashland diesel fuels, gasolines and lubricants are also great favorites in this coal-mining area. They are known for high quality and dependability and are distributed by local business men in each area who put forth every effort to serve your special needs.

Call the Ashland representative in your territory. He will tell you more about Ashland products and what they are doing for the coal-mining industry.

ASHLAND OIL & REFINING



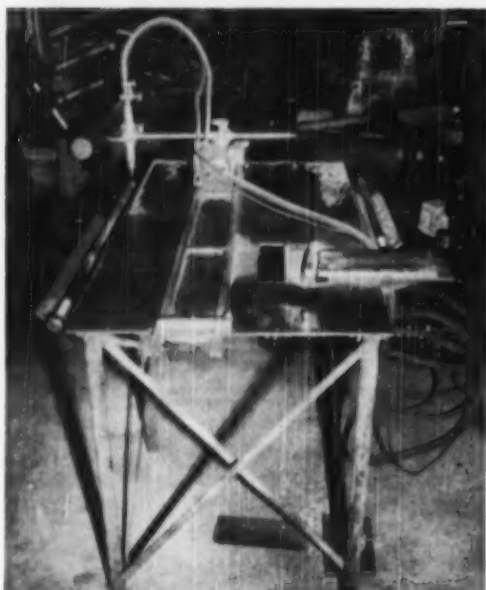
**RIGHT TO
INDUSTRY**

Best!



COMPANY...Ashland, Kentucky

Operating Ideas



ROOF-BOLT-AND-WEDGE-MAKING assembly includes a workbench, steel troughs for holding bolts, a jig for wedge-cutting and a traveling cutting flame.

How to Make Your Own Roof Bolts

ALL THE ROOF BOLTS, roof-bolt wedges and plates currently needed at the company's mines are being made in the central shop at the East Diamond mine of the West Kentucky Coal Co., Madisonville, Ky., where C. P. Tilford is shop superintendent.

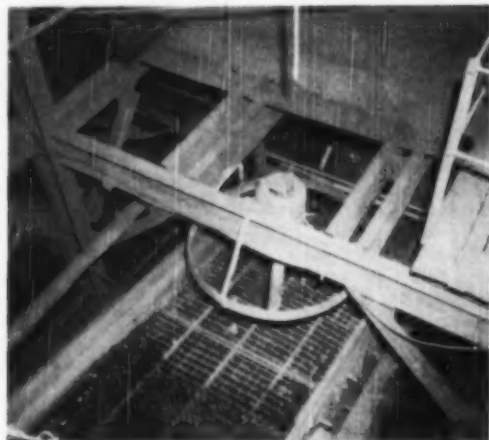
A workbench with jigs and troughs and an Airco Radiograph are the principal components of the bolt-and-wedge-making assembly, shown at the left.

The bolts are made of 1 1/4-in steel rods, threaded on one end and in three different lengths. The threaded bar is laid in one of two troughs on either side of the workbench, depending on the length of bolt to be made. The troughs are welded to the table so that when the steel bar is cradled, the flame from the Radiograph, moving along a fixed track, cuts a 1/16-in slot in the unthreaded end of the bar. The track may be moved to either side of the workbench center, but whichever side it is on, it guides the Radiograph down the center of the rod.

Wedges are made on the same workbench with the help of a jig. The jig is set at an angle to the center line of the workbench so that the Radiograph flame, moving straight down the workbench, cuts a wedge of the right shape from a steel plate held flush against the angled jig. After each wedge is cut off, the steel plate is turned over and the flame passes over it again. This is repeated until the length of plate is used up or until enough wedges have been cut.

Plates for roof bolts are made of any scrap steel that happens to be lying around the shop or yard.

The Radiograph operates on 220 v ac or dc, 5 amp. Its speed of travel is controllable, ranging from 1 to 50 fpm.



SHOP-MADE FAN at Maxton cleaning plant cuts moisture with a blast of air just before coal is loaded for shipment.

Propeller-Type Fan Reduces Surface Moisture

REDUCING SURFACE MOISTURE after wet cleaning is the job of a motor-driven fan designed by Robert J. Emigh, general superintendent, Morrisdale Coal Mining Co., Morrisdale, Pa.

The assembly consists of a shop-made fan blade keyed to the shaft of a 3-hp 440-v GE motor, and is bolted to a beam in the plant above a 2 1/2-deck Robins Gyrex dewatering screen that precedes the loading conveyors. A protective steel ring surrounds the blade path.

The blade is cut from 1/4-in steel plate and is 4-in wide. Proper blade-pitch for moving maximum quantities of air without overloading the motor was determined by experiment.

Mr. Emigh reports that an average of 1/4% reduction in moisture has been attained with the fan, and this has been enough to make the fan a definite asset.

22% MORE TON-MILES PER SHUTTLE CAR HOUR!

WITH BATTERY-POWERED SHUTTLE CARS

Battery-powered shuttle cars have the following advantages demonstrated and proved:

SAFETY

Only battery cars are "permissible"

PRODUCTION

Can produce 10% more tonnage
Deliver more tons per man shift
Give 22% more ton-miles per shuttle car hour

PERFORMANCE

Include all design advances
Travel 25% faster
Discharge 30% faster
Are more dependable and predictable
Handle supplies easier
Reduce shuttle car change time
Can go underground
Promote section efficiency

COST

Equal capital cost
Produce coal in shuttle car sections for approximately $\frac{1}{3}$ less per ton**
—in hand-loaded sections, as much as 75¢ a ton

**Shuttle Car Haulage, AIME, Technical Publication No. 2198.

A "MUST" FOR CONTINUOUS MINING MACHINES

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

AND...

Two-shift operation is now possible with only one set of batteries.



See Gould "Buck" and "T" Batteries

Also Recommended—Gould's
Gould Mining Battery

Proved By 95 Time Studies

THIS IS A FACT! It is proved conclusively by figures available to everyone—figures from 95 published time studies made in mines from Pennsylvania to Illinois.*

These 95 time studies reveal more down-to-earth, factual information about underground loading and haulage than has ever been available before! Now there is positive proof that battery-powered shuttle cars do 22% more work per shuttle car hour... travel 25% faster... discharge 30% faster... can produce 10% more tonnage!

These are just a few of the many facts brought to light by the extensive time studies. A full report on the safety, performance, production and economy of battery-powered shuttle cars, as revealed by these studies, is yours for the asking. You'll want to read it—you must read it to insure greatest economy for your operation! For your free copy of "A Report of Mine Shuttle Car Operations based on 95 Published Time Studies," write Dept. M-109.

Underground Loading and Haulage Division, Mechanical, 1947.

GOULD

STORAGE BATTERY CORPORATION

ELIZON 7, NEW JERSEY

Always Use Gould Automobile and Farm Batteries



SLAKING ALONG from the pump at the far end, aluminum pipe stretches through an old pit and upward toward the discharge end.



ALUMINUM PIPE carries water away from the working area. Here, a 45-deg elbow turns the pipe over the hump of a spoil ridge.

Aluminum Pipe Speeds Pit Drainage

USING 6-IN ALUMINUM PIPE in 20-ft sections, strip-mine workers can start water out of a pit within 20 min after the pump is put in place at the pit of the Tecumseh Coal Corp., Boonville, Ind. In addition, use of the pipe saves manpower and replacement costs.

A 20-ft section of the pipe weighs only 35 lb and can be carried and put in place easily by two men. Each section is equipped with a McDowell coupling—a slip joint that requires

no screws or bolts. The joints are kept closed tight by pressure of the water. When pressure falls below 3 lb, the joints open automatically and the pipe drains, thus eliminating the danger of freezing in cold weather if the pump happens to be idle.

Besides costing less originally than rubber hose, the aluminum pipe has a long life, largely because it is not dragged from place to place but is picked up in sections and carried when the time comes to rearrange pit drain-

age. The only rubber hose needed is a short length leading from the pump to the first section of pipe, though hose may be inserted elsewhere.

The pipe is the same sort as is used for irrigation, certain water-handling chores in widely different industries and firefighting and other safety purposes. It is fabricated and sold by Oldfield Equipment Co., Cincinnati, Ohio. Ten-foot lengths, 45-deg elbows and coupling adapters also are available.

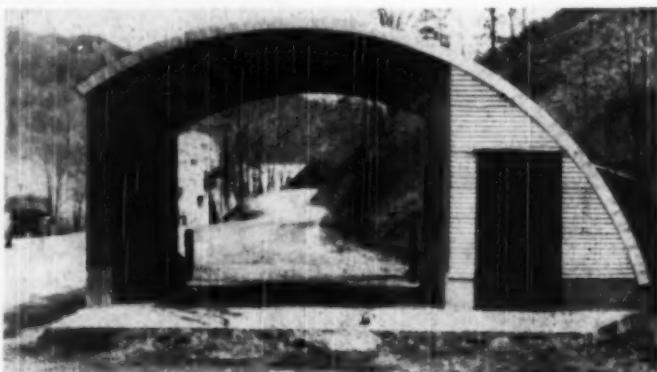
Quonset Construction Makes Efficient Scale House

ECONOMY OF CONSTRUCTION and reduced scale maintenance are important features of this Quonset-type scale house recently built at Van Lear, Ky., by the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky.

In addition to reducing the necessary maintenance on the scales, the covered scale platform also facilitates operation during rain or snow. The concrete ramps on the scale approaches permit easier cleaning and better drainage around the scale.

The scale house is built of a 24x24-ft Quonset, with the ends partially open and the normal foundation raised approximately 1 ft to provide greater clearance for trucks and more headroom in the weighman's office. The scale is located in a concrete pit, with the dial inside the office. The scale platform measures 9x20 ft and the scales have a rating of 20 tons.

The inside of the building is divided into two insulated rooms, one



for the weighmaster and scales and the other a separate room for truck drivers, with a sliding window between. The drivers' room has a sep-

arate entrance and was provided as a place for them to warm up in cold weather or to stay if they have a waiting period.

MACK TRUCKS

haul

Profitable Pay loads

10 TO 50 TONS

**Gasoline or Diesel • Four or Six Wheels
Truck or Tractor**

• In pit and strip mining, in quarrying and excavating work — wherever an off-highway, earth-moving job calls for rugged strength and stamina — there's a Mack truck *sized right and built right* to do the job as only a Mack can do it — with masterful efficiency, bed-rock economy, and enduring reliability.

Power and brawn for the heaviest loads! Maneuverability and ease of control for fast loading and unloading! Traction and flotation for the most slippery mud or sand! These are the qualities that assure greater profits through greater output. You get them all with Mack trucks because only Mack offers so many outstanding and exclusive features of design and construction.

We'll be glad to send you detailed information on these profit-building features, together with complete specifications on any or all of the Mack models shown here. Write for copies of our catalogs.

IT'S PART OF THE LANGUAGE:

Built Like a **Mack** *Truck*

Model LRSW tractor
— 50-ton payload



Mack Trucks, Inc., Empire State Building, New York 17, N.Y.
New Brunswick, N.J.; Long Island City, N.Y. factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.



Model LIX — 10-ton payload



Model LMSW-M — 15-ton payload



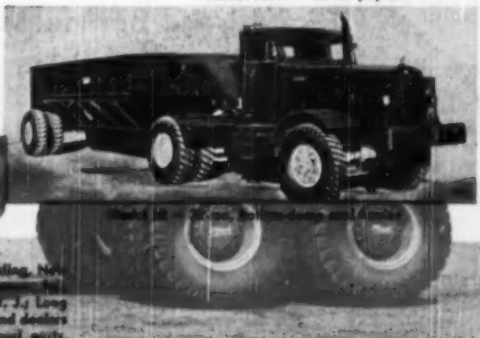
Model LV — 22½-ton payload

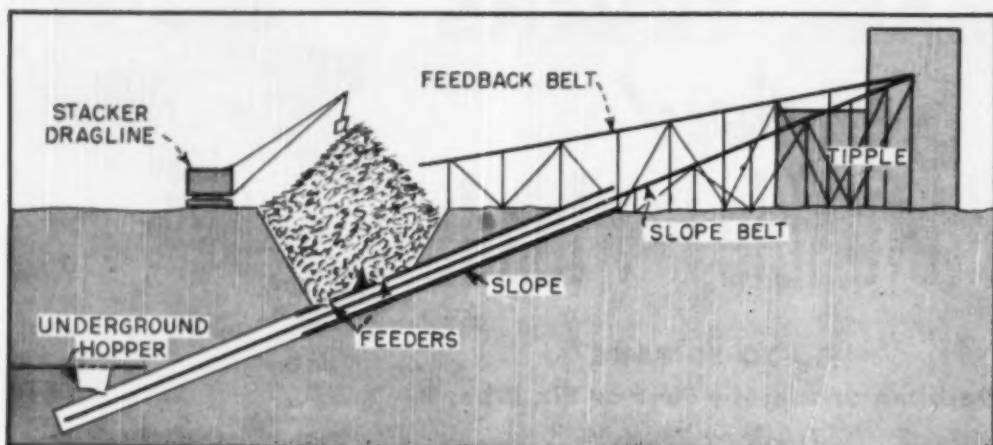


Model LMX — 20-ton payload

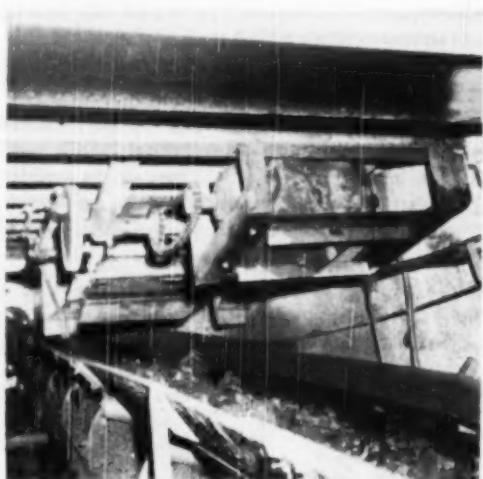


Model LRSW — 30-ton payload





STORAGE BIN receives raw coal over pass-back belt from top of slope belt when tippie is shut down.



STANDBY DRAGLINE keeps coal stacked away from discharge end of pass-back belt. Beneath bin and inside slope, twin feeders drop stored coal onto belt for redelivery to preparation plant.

Big Storage Bin Helps Avoid Shutdowns

A 10,000-TON STORAGE BIN built above the 550-ft-long concrete-lined slope enables the underground workings to keep going when the preparation plant is down or the tippie to keep going when the mine is down at the Rio Verde (Green River) mine, Norton Coal Corp., Green River, Ky.

To excavate the bin, shown in the accompanying drawing and photographs, a dragline made a truncated-cone cut down to the top of the belt slope leading from the underground dumping point to the preparation plant. At the bottom of the cut and above the slope a 12-in-thick concrete slab, reinforced with steel and resting

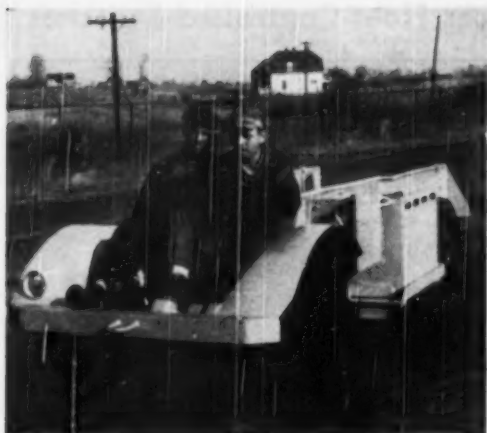
on transverse 12-in steel I-beams on 24-in centers, was laid to form the truncated apex of the cone. Two plate feeders, operated by 40-hp GE motors, were built into the slab at points directly above the belt.

Inside the tippie, where the slope belt discharges, a gate was built and a belt was installed from the tippie back to the storage bin in such a way that opening the gate would deflect the coal coming from the slope belt onto the storage-bin belt, which in turn would carry coal to the big bin.

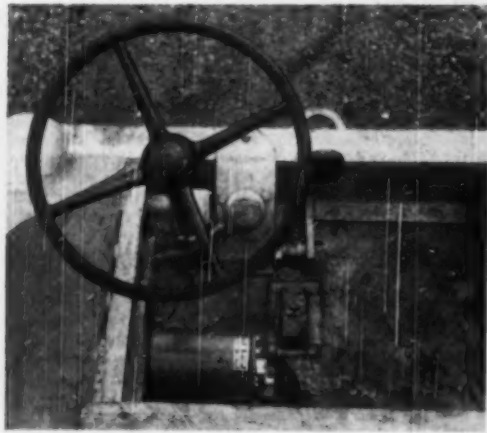
With this system, coal coming from underground on the second shift or when the tippie is shut down is run

into the storage bin. When the tippie is ready to start up again, it can take coal from underground if the mine is working or, if the mine is shut down or underground production is interrupted during the shift, can draw coal from the big bin. This is made possible by the feeders at the bottom of the bin, which discharge directly onto the slope belt.

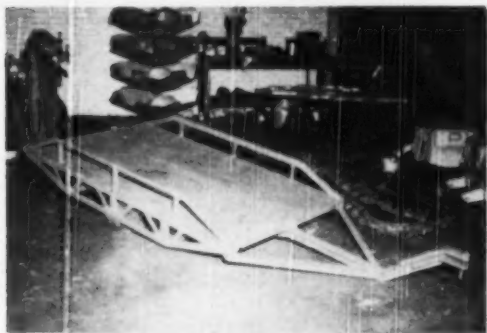
Rio Verde officials point out that this plan insures continuous uniform feed to the tippie and makes underground and surface operations relatively independent of each other. The total effect is to add flexibility to production.



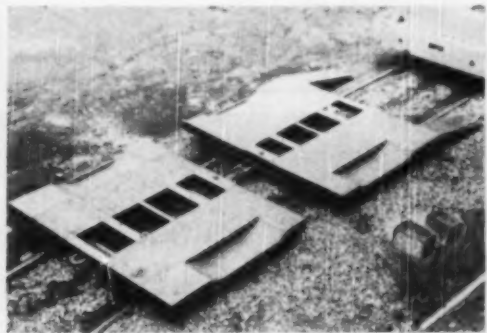
SHOP-BUILT MINE JEEP hauls supervisors, emergency men and light materials around the mine. Company has standardized on this model, battery-powered or trailing-cable, for all its mines.



JEEP'S CONTROLS, seen from above driver's seat, include a "go" button and brake pedal, both operated by foot, and a lever for reversing. Interchangeable parts make repairs easy.



JEEP TRAILER is secured to jeep by pin coupling. It hauls conveyor pans, timber and other materials around the mine. Trailer is welded steel and wheels are rubber-tired.



SHUTTLE-CAR CARRIER is specially designed to fit "buggy" wheels but each of the twin units can be used separately, if desired, for moving cutters or loaders.

Mine-Made Units Speed Underground Service

THREE SHOP-BUILT UNITS, now standardized in production details and built in the central shop at Johnston City, Ill., speed transportation of supervisors and emergency men, equipment and materials in mines of The Consolidated Coal Co. Shown in the accompanying photographs, the units are a "jeep" and a trailer for use in trackless sections and a transfer car for track sections. The jeeps, built with interchangeable parts for quick, efficient repair and maintenance, have standard Ford transmission and steering assemblies, 1942-1946 models. Some are powered by batteries, 90-v; others by trailing cables, 250-v. All have contactor controls, hydraulic brakes and brake pedals. A foot-operated "go" button next to the brake pedal closes the electrical circuit that puts the jeep

in motion. Pressure on this button must be sustained to keep the vehicle in motion. The jeep is powered by a 5-hp Reliance 9J motor.

For moving conveyor pans, timber and other materials, Consolidated builds rubber-tired flat trailers like the one shown in the accompanying photograph. Of welded-steel construction, the trailers will carry heavy loads. They are hooked onto the rear end of the jeeps by pin couplings, which hold the trailer beds level in transit.

For moving shuttle cars, rubber-tired cutters and other heavy equipment, the shop builds transfer cars to be pulled on rails by locomotives. These cars are built in two sections. Twin ramps can be attached to either end to provide easy loading of mobile equipment. Depressions in the trans-

fer-car beds are designed to fit shuttle-car wheels, thus holding the big "buggies" steady during transit and reducing the combined height of the transfer car and shuttle car. The coupling between the two sections permits sharp turns. It can be removed if desired and the two sections used separately for transferring loaders or other equipment that will not fit well on the two-section unit.

YOU'RE NO SLOUCH at figuring out useful operating ideas, so why be bashful about telling others about them? They'll get cash for you, too, if you send them to **COAL AGE**. See the notice on p 137.

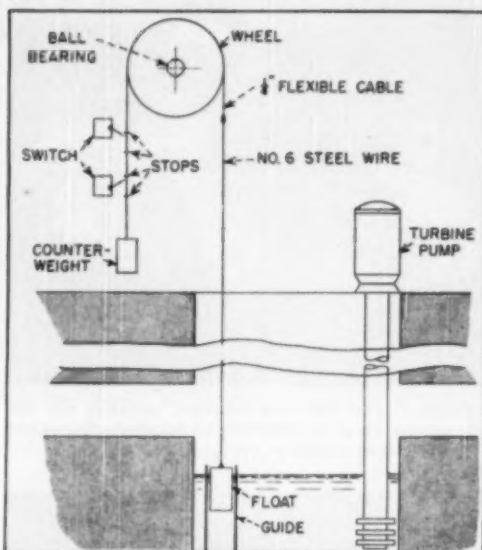
Flexible Pumping System Features Float-Controlled Switches

WILLIAM REITZ, Jewel Mining Co., Paris, Ark., describes a pump control scheme in use at No. 2 airshaft of Jewel Mine as follows:

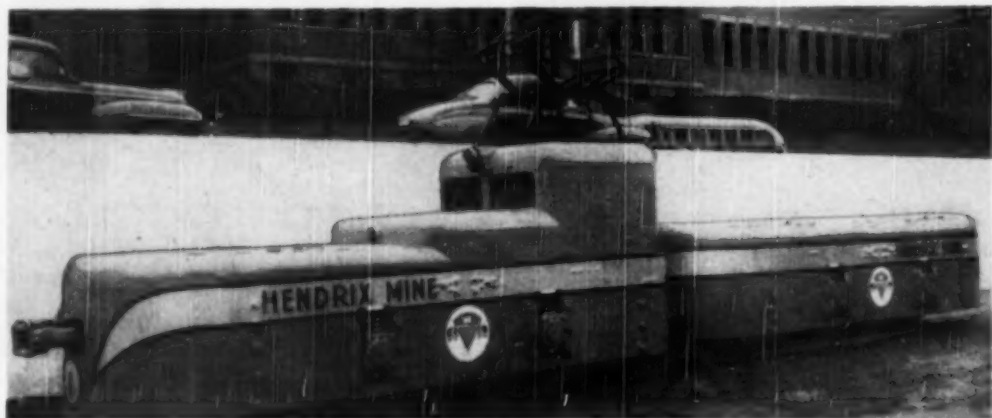
"Two 1,000-gpm turbine pumps are installed on the surface approximately 250 ft above the sump. The float in the sump is enclosed in a perforated cylindrical guide and a No. 6 steel wire runs from the float to the surface. Here the wire is attached to a 1/4-in flexible cable that runs over a ballbearing sheave. A counterweight is attached to the end of this cable.

"Stops are placed on the cable to actuate the pump-control switches. As shown in the sketch the upper switch is ON and the lower switch is OFF. The upper switch controls pump No. 1 which is capable of taking care of all normal amounts of water. If this pump fails to lower the water level, or fails to start, the float continues to rise, and the lower set of stops closes the circuit to pump No. 2. As the water level recedes one or both pumps will be shut down by the cable-mounted stops.

"Any number of pumps can be cut in or out of the system by increasing the number of stops and spotting them at the correct places."



AMOUNT OF WATER in the sump controls pump duty in this set-up.



NEW 20-TON TANDEM LOCOMOTIVE built in the Consol (Ky.) central shops is a streamlined unit designed to operate with a high degree of efficiency and safety.

Mine Staff Builds 20-Ton Locomotive

COMPLETELY DESIGNED and built at the company's central shop, this new 20-ton mine locomotive now is in use at the new Hendrix mine of the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky. Top operating efficiency, a high safety factor and operator comfort were prime considerations in its construction by the shop staff, under the direction of Damon Duncan, master mechanic.

The unit consists of two GE Type

711 10-ton locomotives in tandem, the four motors delivering a total of 268 hp with a speed of about 8 1/2 mph at full drawbar pull. Features built into the locomotive include hydraulic brakes, hydraulically operated sanding valves, magnetic-contactor control, sealed-beam headlights, an electric warning siren and electric windshield wipers.

With the pantagraph, it is not necessary to change the trolley when changing direction and jumping of

the trolley wire also is eliminated. The pantagraph can be lowered when necessary from inside the cab by a pull rope. Storage for jacks and railers is provided in a space ahead of the cab. Hydraulic hose connected to axle bearings permit lubricating the bearings without removing covers. To guard against accidental coupling breakage, the two units are connected with safety chains. Each motor case also has safety chains to prevent its dropping should the suspension fail.

SIMPLICITY, COMPACTNESS, EFFICIENCY, LONG LIFE, make the **LINK-BELT**

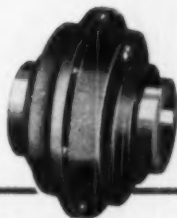
**"RC" TYPE
FLEXIBLE COUPLING**
the most economical
solution to many of your
coupling problems.



HOUSINGS

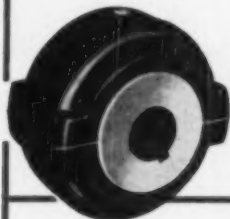
STYLE R,

revolving housing, spun
metal vertical split.



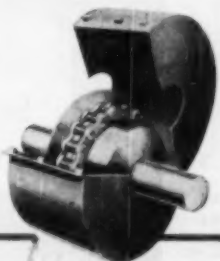
STYLE P,

revolving housing, plastic
horizontal split.



STYLE S,

stationary housing,
welded steel.



Simplicity — it consists of two cut tooth sprocket wheels which are connected by a piece of specially constructed Precision Steel roller chain, using a patented divided roller feature.

Compactness — small in size for horsepower transmitted.

Efficiency — when properly aligned as efficient as a roller chain drive.

Long Life — design assures long wear life when couplings are properly applied.

FROM STOCK — housings and couplings in a wide range of sizes and bores to meet most needs.

LINK-BELT COMPANY

Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5,
San Francisco 24, Los Angeles 33, Seattle 4, Toronto 6, Johannesburg. Offices
in Principal Cities.

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LINK-BELT

Flexible Couplings



The Completely New and Advanced

WHEAT "FORTY-NINER" ELECTRIC CAP LAMP

With all these new features:

- 25% greater light output, yet no increase in battery size!
- New, incredibly impact-resistant battery jars of Butalite in "high-visibility yellow!"
- Simple and positive adjustment for focusing the light beam!
- Stainless steel battery jar tops, smoothly contoured for maximum wear!

Plus these time-proven exclusive Wheat features:

- Constant, steady, dependable light for full-shift satisfaction.
- "Ironclad" batteries.
- Actual self-service—fully automatic charging.
- Appreciable savings in lamphouse maintenance.
- No burns from electrolyte.

*Write for Bulletin No. 498,
and ask your N. M. S. representative for an actual demonstration.*

Wheat Electric Cap Lamps Are Sold,
Installed and Serviced Exclusively by . . .

BEMECO DIVISION
Beckley, W. Va.

KY.-VA. DIVISION
Jenkins, Ky.

ALL-STATE DIVISION
Logan, W. Va.

ANTHRACITE DIVISION
Forty Fort, Pa.

WHITEMAN DIVISION
Indiana and Altoona, Pa.

WESTERN KY. DIVISION
Madisonville, Ky.



U. S. BUREAU OF
MINES APPROVED

**National Mine
Service Company**



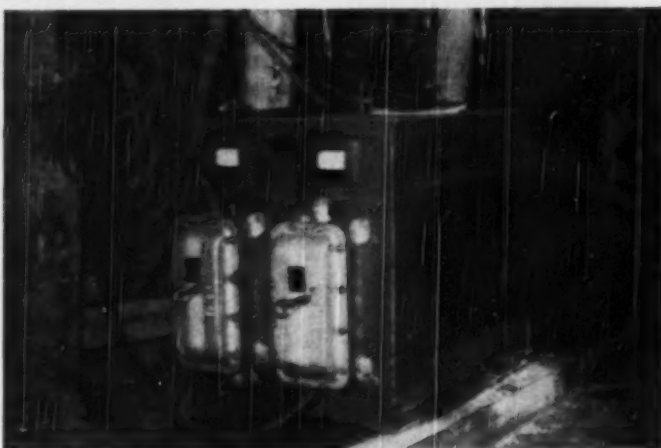
Selenium Rectifier Serves Shuttle Car

A 25-KW SELENIUM RECTIFIER has been supplying dc power for a 10SC shuttle car at the Sunnyside mine of the Kaiser Steel Corp., Sunnyside, Utah, since December 28, 1949. Because all other mining equipment operates on ac power, it was necessary to supply a separate dc source for shuttle cars, which led to trial of the selenium unit, a Celab rectifier supplied by the Clark Electronic Laboratories, Palm Springs, Calif. Previously, small mg sets had been adopted for this service.

R. G. Heers, manager at Sunnyside, reports that the shuttle car operates very satisfactorily on this power, and cites these ten rectifier advantages:

1. Light weight.
2. Easy portability.
3. Low maintenance.
4. Low initial cost.
5. High overload capacity.
6. Good power factor.
7. Silent operation.
8. Long life.
9. No moving parts.
10. No lubrication.

The rectifier operates at a nominal 250 v, ac, with actual input fluctuating between 230 and 265 v because of varying loads and line losses in the ac system. Output voltage varies between 235 and 270 v, dc, but this variation is within the design limits of the shuttle-car motors. Input and 100-amp dc output circuit breakers are built into the rectifier.



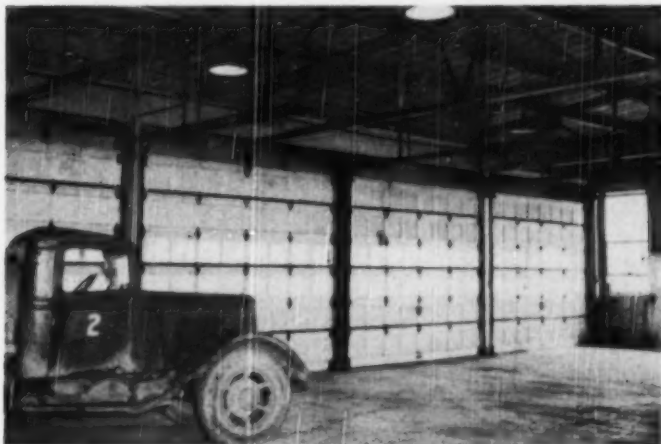
LIGHT PORTABLE RECTIFIER produces dc power at shuttle-car cable nips.

Voltage regulation to be installed on the 4,160-v ac feeder will smooth fluctuations in input voltage, and a regulator can be installed directly on the unit to closely control output voltage. Output regulation should not be necessary for normal mine use, Mr. Heers says.

The unit is approximately 34x34x30 in high and weighs 600 lb. It can be set up close to the shuttle car dis-

charge point. The car cable is plugged into a receptacle in the rectifier. A voltmeter and ammeter are provided for the output side.

Mr. Heers says: "Insofar as capacity is concerned I am confident that a 37½-kw rectifier would handle two 10SC shuttle cars with ease. The cost of a 37½-kw Celab rectifier is less than half the cost of an equivalent mg set."



SMALL MOTOR AND COIL SPRING make it easy to raise and lower garage doors.

Small Motors Operate Garage Doors

HEAVY WOODEN DOORS big enough to admit tractors and 35-ton trailers are raised and lowered by

small electric motors at the garage of Blackfoot Coal & Land Co., Oakland City, Ind. Above each door a ½-hp

GE motor with reduction gear provides the needed pull through a system of wire ropes and sheaves. Effective work required of the small motor is reduced by a steel coil spring above each door. This spring, like a watch spring, winds up tight as the door is lowered, thus providing pull to help raise the door and cutting dead weight of the door to about 20 lb. Controls for the doors are located at the chief mechanic's workbench.



Your Ideas Wanted!

A GOOD IDEA can always help someone—so why not send us all those operating, maintenance, safety or electrical ideas you've successfully put to work. COAL AGE will gladly pay you \$5 or more for each acceptable one, on publication. Write today to: The Editor, COAL AGE, 330 W. 42nd St., New York 18.

2 EXAMPLES OF HOW NEW HORIZONS IN

Read the details of these two installations. They may not duplicate your own problem—conveyor jobs are rarely similar. But you can see, from these typical cases from "U. S." files, why so many operators call on "U. S." for belting to insure economical operation.

PAST

...IN 1939 LONGEST SINGLE-UNIT SLOPE BELT IN OPERATION WAS BUILT BY UNITED STATES RUBBER COMPANY FOR AN ILLINOIS MINE



Still in operation, this belt in the last eleven years has lifted 8,000,000 tons of raw coal. In addition, the belt carried hundreds of thousands of tons of rock.

Known as U. S. MATCHLESS BELT, it was the first to use 48-ounce duck. Width 54", length 1,530 feet, lift 206 feet. Carries 1,000 tons of coal per hour at 350 feet per minute.

IN THE FUTURE

LOOK TO "U. S." FOR NEW TRIUMPHS

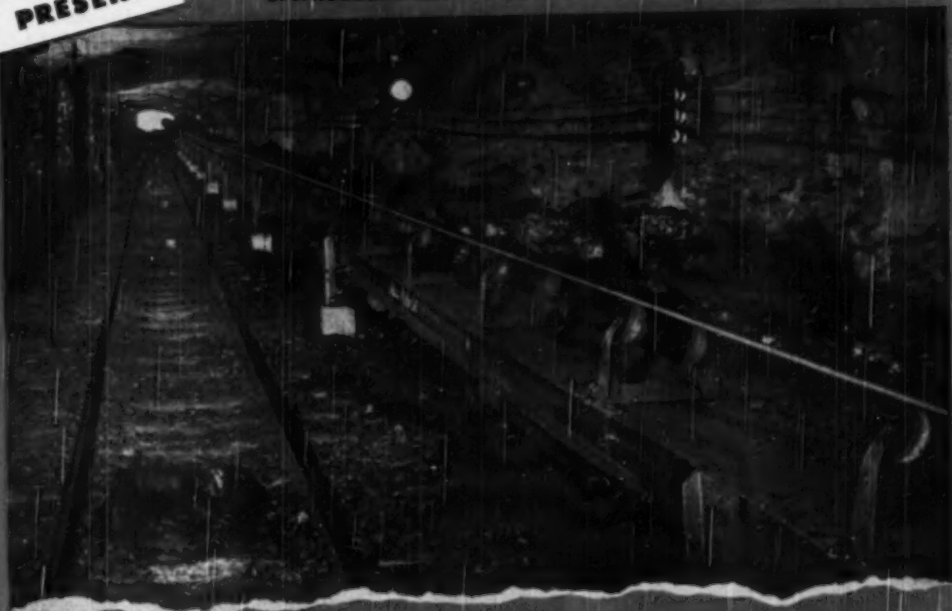
When you have a coal-handling problem—underground, slope or surface, call in a U. S. Rubber engineer. Write to address below.

UNITED STATES
MECHANICAL GOODS DIVISION

"U.S." ENGINEERING REACHED *OUTPUT and ECONOMIES*

PRESENT

...LONGEST SINGLE-UNIT SLOPE BELT IN DAILY OPERATION IS
U.S. RUBBER'S USTEX NYLON BELT IN A PENNSYLVANIA MINE



2,000 feet in length, 15-degree incline, 645-foot lift! This mammoth conveyor saves 6,000 feet of coal travel, cuts haulage cost 50¢ per ton with 25% lower investment. Made of super-strong Ustex® and flexible nylon, this belt is directly re-

sponsible for keeping the mine in operation. Before U. S. Rubber engineers developed the belt, the operators had closed the mine because of high operating and maintenance costs.

IN BELT HAULAGE

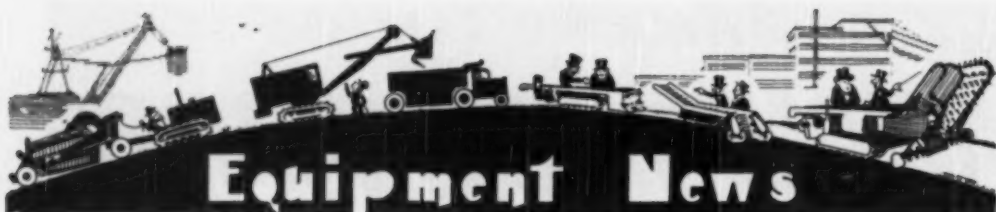
PRODUCTS OF

U.S. RUBBER
SERVING THROUGH SCIENCE

*Reg. U. S. Pat. Off.

RUBBER COMPANY

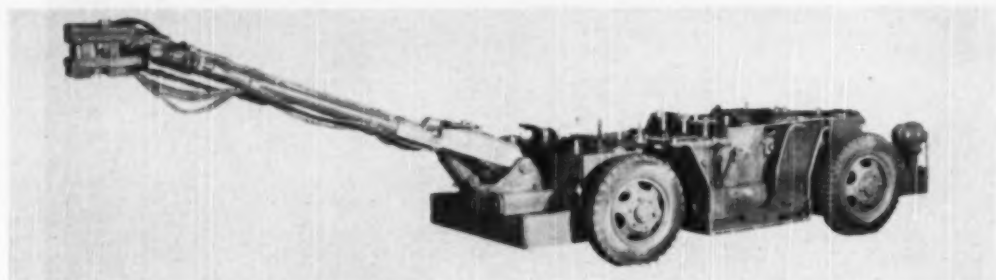
ROCKEFELLER CENTER, NEW YORK 20, N. Y.



Here's a New Coal Age Reader Service — That Will Save You Time in Obtaining Information on New Equipment and Bulletins Described in This Section

You'll find a new postage-free addressed postcard facing p 148. As you check through the new products and manufacturers' bulletins described on the following pages, note the numbers of the items that interest you. Circle those

numbers on the card and mail it to Coal Age. We will pass your request on to the manufacturers. Use the card, also, to secure information on any product described in the advertising pages of this issue.



Electrically Powered Hydraulic Roof-Bolting Drill in Models 26 to 36 in High (1)

New Joy RBD-1 all-hydraulic roof-bolting drill employs a boom feed and is self-leveling and self-aligning while drilling. A self-propelled unit available in 26-, 30- or 36-in heights, the RBD-1 is said by the manufacturer to have an extremely high drilling

speed where rotary-type drills are applicable, which is the case with 60 to 65% of the roof overlying U. S. coal beds, according to USBM reports. The unit can be equipped for wet drilling or with a vacuum dust remover. The low height of the drill-

ing mechanism, permitting bottoming the maximum-possible hole with only one steel change, is an important feature of the RBD-1, Joy states. Powering the unit electrically eliminates the need for compressed air at the face.—Joy Mfg. Co., Pittsburgh 22.



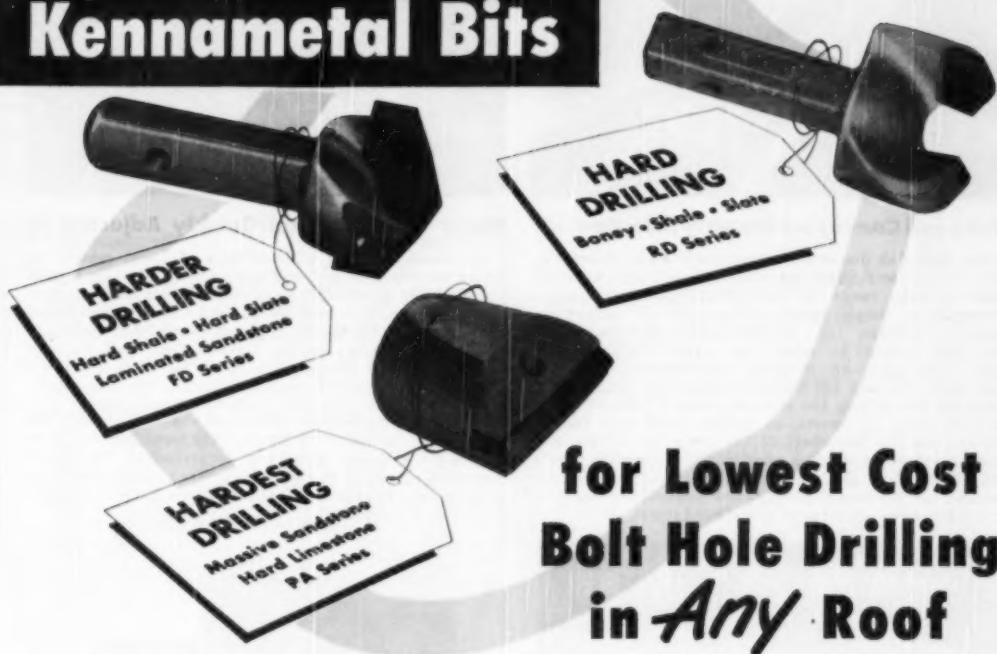
Roof-Drilling and Bolting Head Powered by Timbering Machine or Other Unit (2)

Combination drilling and bolting head designed for application on the Baker timbering machine to permit saving time by roof-bolting and timbering with the same machine, also has available two alternate drill mounts for use if the timbering machine is not required. One mount includes a self-trimming feature, while the other is moved by hand. The drill

head is equipped with a chuck taking a standard rotating drill and is mounted on trunnions so that it may be quickly rotated to bring the torque wrench into position for simple, one-man operation. According to the manufacturer, drilling an average hole takes 1½ to 2 min, inserting and tightening the bolt, 1 to 1½ min. The hydraulically driven head can be

powered from the hydraulic system of a timbering machine or cutting machine, or from a separate pump on the mount electrically driven through a drag cable. To insure maximum drill advance in a given seam height, both types of mounts feature a telescopic design. — Baker Industrial Truck Div., Baker-Raulang Co., Cleveland 2.

Kennametal Bits



These are a trio that can add new drilling speed to your bolt drilling job. There's one to save money on drilling time OVER ANY OTHER BIT. Regardless of your roof condition, there's a Kennametal Bit to drill FASTER and at less cost.

The RD Style drills better and lasts longer in boney, shale, and slate than conventional Kennametal coal bits. Its strong, stubby prongs, tipped with extra thick Kennametal cemented carbide gives long service life on HARD roof jobs. For drilling HARDER roof, like hard shale and slate, laminated sandstone, etc., the FD series drill offers maximum drilling power. While not as fast as the RD Style, it operates 20% to 30% faster than percussion drills. Either the RD or the FD series can be used on standard coal drills. Your Kennametal representative has many suggestions on mounting that he will be glad to give you FREE.

The PA series drills the hardest material like massive sandstone and limestone roof. Because of its single blade construction, it drills 10% to 20% faster than other percussion type bits.

Remember the Kennametal BIG 3 in your next bolting plans. They can save you money on drilling time OVER ANY OTHER BIT. Plan now to call a Kennametal representative in when you start to bolt up. He will be glad to give you the benefit of his specialized experience. He will also be glad to demonstrate—to make sure you have the BEST bit—SPEED, COST, and JOB considered—that your money can buy.

Contact him by writing — Mining Division, Kennametal Inc., Latrobe, Pa.

- Less Bit Changing
- Lower Bit Cost
- Easier Drilling
- No Hole Taper
- More Secure Bolts



New Roof Pinning Rod for
FD and RD Rotary Series

Kennametal Inc., Latrobe, Pa.

Please send me FREE fully-illustrated Kennametal Folder M-105 that shows 21 different sizes of three different drill styles and complete details on how to get lowest possible roof drilling cost.

Name _____
Address _____
City _____
State _____

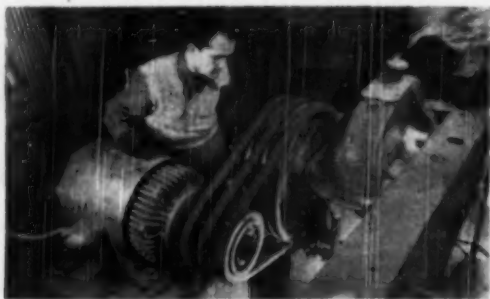
KENNAMETAL®

Drill Bits • Machine Bits • Strip Bits • Rock Bits



Packaged Conveyors Simplify Selection (3)

New Redi-Fab line of belt conveyors includes 49 lengths, three widths and numerous variables and accessories to cover a wide range of permanent belt installations. Packaged in simple logical components to permit the greatest number of combinations, Redi-Fab units are both simple to select and erect without technical knowledge, or involved calculations, the company says. The line has five new drives, including partial reduction for driving the conveyor from a power-take-off shaft of other equipment, as well as three new feeders driven from the foot-shaft of the conveyor. A new 40-p catalog contains simplified selection data, together with a "Redi-Fab Conveyor Layout Sheet" that permits the user to make his own layout down to the location and selection of the supports.—*Barber-Greene Co., Aurora, Ill.*



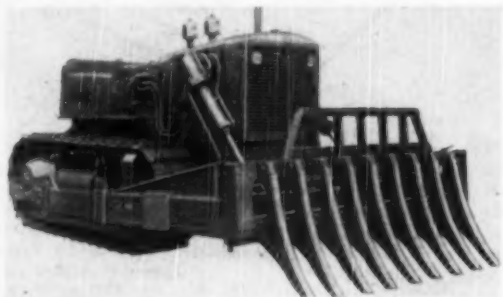
Motor Speed Control Quickly Adjusted (4)

An economical and efficient form of speed control recently developed by A-C engineers for applications requiring frequent speed changes or adjustments without shutting down the drive reportedly is now being employed at various mines. Consisting of a new Vari-Pitch automatic sheave, companion sheave, Texrope belt and Texslide motor base, the combination is being used for speed change ratios up to 2:1. Features cited by the company include easier and smoother starting; speed change by a simple screw adjustment taking only a few seconds application to high starting torque; and mounting at almost any angle when the motor base is horizontal. The speed-control combination is used on standard motors from 1½ to 40 hp and speeds of 900 to 1,800 rpm.—*Allis-Chalmers Mfg. Co., Milwaukee 1.*



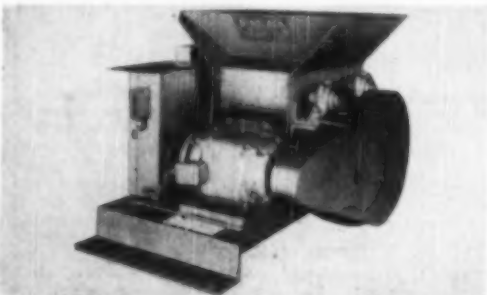
Shovel-Loader Features High Dumping (5)

New Type HL Model 100 Dempster-Digger, an automotive hydraulic shovel loader, is specially designed for high dumping, with the low point of the digging bucket raising to 13½ ft above ground. The unit has a crowd reach of 10½ ft and reportedly will dig through an 18-ft bank. According to the manufacturer, it is the only small shovel operating with hydraulic crowd and hoist action and is available also with crawler-type traction.—*Dempster Bros., Inc., Knoxville, Tenn.*



Root Ripper Speeds Land Clearing (6)

The root ripper, a new companion tool to the Baker line of bulldozers and graders, is designed for general land-clearing operations and may be purchased as an interchangeable attachment for cable and hydraulic units, or as a complete machine. Recommended by the manufacturer for removing and piling brush, roots, rocks or boulders, the attachment has nine teeth designed to produce a rolling action that shakes dirt loose. Bulletin 837 available.—*Baker Mfg. Co., Springfield, Ill.*



Two-Stage Unit Crushes Stoker Coal (7)

New "Two-Stage" lightweight heavy duty Gundlach crusher incorporates two crushing stages in one machine and is designed to reduce mine-run to stoker in one operation. Units with 18-in crusher rolls have been operating at 60 tph but are so constructed as to be adapted to larger capacities with no loss of efficiency, the manufacturer states. The unit is 42 in high, 47 in wide and 6 ft 3 in long. The contact portions of the balanced steel crushing rolls are hard-faced and are readily built up, it is said. The crusher has steel-cut gears running in oil and Timken roller bearings and is powered through silent chain or V-belt. Bulletin available.—*T. J. Gundlach Machine Co., Belleville, Ill.*

AMERICAN PERMISSIBLE EXPLOSIVES... for any seam of coal



As a result of intensive research, close chemical control and unremitting care in manufacture, the AMERICAN list of permissibles provides an explosive exactly fitted for the most effective use in any seam—for either hand or mechanical loading. With a complete range of velocities and densities, the list of AMERICAN Explosives includes one exactly suited to your blasting requirements.

AMERICAN Explosives have been thoroughly proven through many years of service in representative coal mines. You can count on them! And you can count on prompt delivery service, too—from well-located plants and distributing points. Always specify "AMERICAN".

Capable Field Engineers are Available at Your Call

★ High Explosives ★ Permissibles ★ Blasting Powder ★ Blasting Accessories

FOR EITHER MECHANICAL
OR HAND LOADING

NON-GELATINOUS

Fast	Medium	Slow
American 22	American 11	American 1
American 23	American 12	American 2
	American 12A	American 3A
	American 14A	American 4A
	American A	American 5

GELATINOUS

Fernigel 1	Fernigel 2A
Fernigel 3	Fernigel 4
Blasting Powder	Granular
Blasting Powder	Pellet



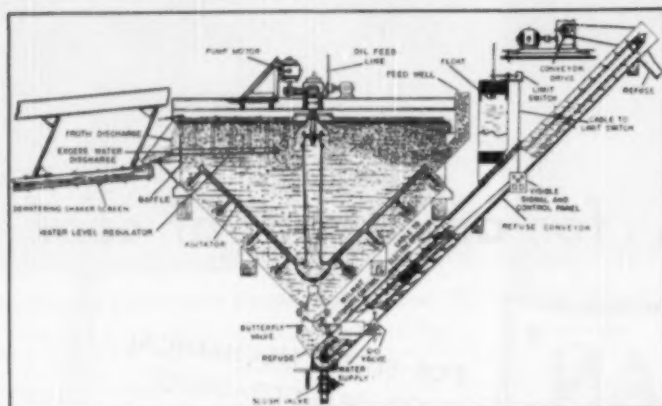
AMERICAN *Cyanamid* COMPANY

EXPLOSIVES DEPARTMENT

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Sales Offices: Pittsburgh, Pa. • Bluefield, W. Va. • Scranton, Pa. • St. Louis, Mo. • Chicago, Ill. • Pottsville, Pa. • Hazleton, Pa. • Maynard, Mass.

Unit Features High Yield of Fines (8)

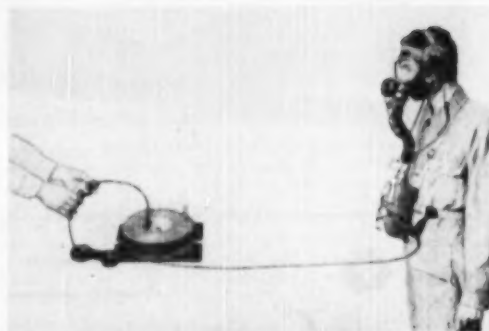


Newly announced Wilnot froth-flotation separation unit is said by the manufacturer to effect an average increase of 35% in the yield of marketable fines. Concentration of all operations in one unit, it also is said, offers advantages in floor-space economy, operating time, power, and as labor costs, with low oil consumption an added feature. Operation is completely automatic, with controls, originally developed for Wilnot Hydrotators and equipped with audible and visual signals, maintaining a sharp separation through wide variations in intake quality and quantity. The unit presently is available in four models, with cone diameters of 6, 9, 12 and 16 ft. and clean-coal capacities of 9 to 80 tph. The unit recovers fines from minus 3/64 in to ± 100 mesh and with an additional unit, total recovery down to ± 0 mesh can be achieved, it is said. Bulletin FF501.—Wilnot Engineering Co., Hazleton, Pa.



50-Ton Units Enter Coal Service (9)

This 50-ton Dart tractor-trailer is one of seven recently delivered to an Indiana coal stripper. The tractor is powered by a 300-hp Cummins diesel equipped with an Allison torque-converter and Torqmatic transmission, and represents the first fleet installation of this engine and converter in any industry. Among the features cited by the manufacturer are: bottom-dump air-operated doors; hydraulic steering; Dart triple-reduction rear axle with 85,000-lb capacity; and 18:00x24 tires on the trailer and rear tractor wheels.—Dart Truck Co., Kansas City, Mo.



Two-Way Phone Helps Mine Rescue (10)

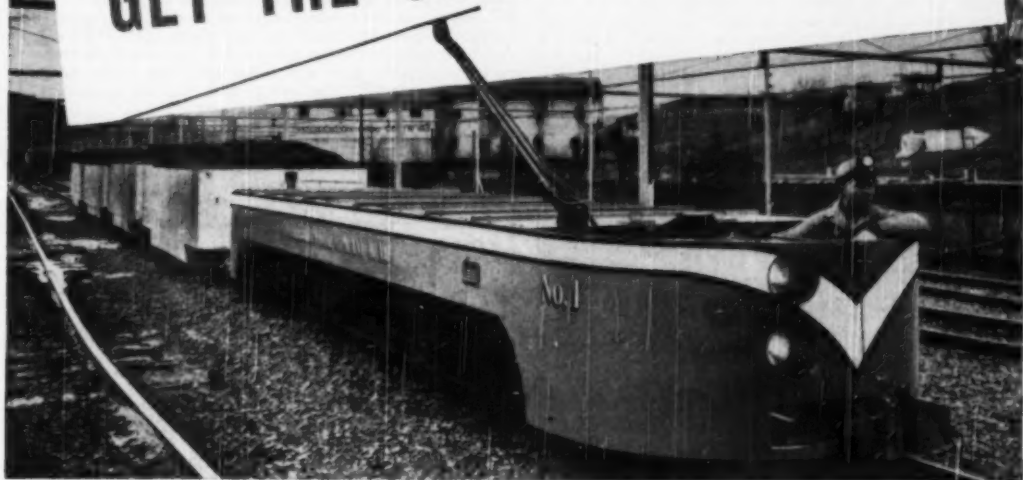
The new MSA Maskfone is expected to add new flexibility to rescue and recovery work and mine-fire control by permitting instant two-way voice communication between the fresh-air base or surface and the working group. The Maskfone is sound-powered and completely self-contained, with no batteries or external power source, and reportedly is effective over up to 30 mi. of wire. It can be used with any MSA "All Vision" facepiece equipped with the "Cleartone" speaking diaphragm, which is to be standard equipment on all MSA Chemox apparatus in the future. Bulletin available.—Mine Safety Appliances Co., Pittsburgh 8.



New Truck Line Offers 10 Models (11)

New Federal "Style Liner" series of light- and medium-duty-trucks is said to incorporate more than 100 new and improved all-truck features as a result of 5 yr of engineering research by the company. The 10 models are available with gross vehicle weights up to 21,500 lb and tractor-trailer weights up to 42,000 lb, and with four high-torque engines ranging up to 126 hp. Eight wheel-base lengths range from 126 to 250 in. Improved driver comfort and visibility, greater motor accessibility and increased engine dependability and performance are among the many features cited by the manufacturer.—Federal Motor Truck Co., Detroit 9.

HEAVY DUTY HIGH SPEED LOCOMOTIVES GET THE COAL OUT FASTER



Mechanized mining requires powerful, fast moving mine haulage locomotives to increase mine output. Operating speeds of 12-15 mph and high continuous ratings with G-E mine locomotives will get the coal out faster, and slash operating expenses at the same time!

Rugged—but easy on the track

Tough, durable locomotives, they'll stay on the job day after day—with a minimum of maintenance. Equalized spring suspension

lessens track wear. Balanced design enables 'em to hug the rails at top speeds. Smooth pickup permits operation close to the slipping point of the wheels, increasing the load that can be started.

Call your G-E representative. He will show you how G-E mine haulage locomotives fit readily into your mine mechanization program. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL

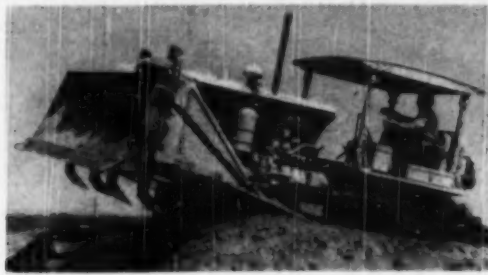


ELECTRIC



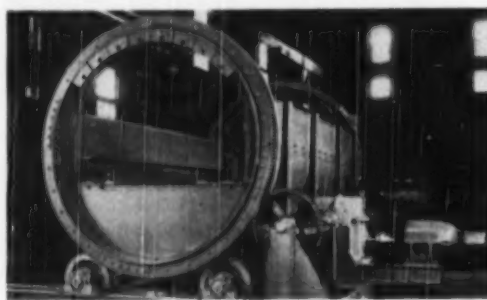
Rear-Dump Unit Takes 9-Ton Load (12)

New E-9 Tournarocker rear-dump hauling unit is designed for loading by shovel, dragline or backhoe and is powered by the D Roadster Tournapull with a GM 4-71 engine. The unit has a 9-ton or 10-cu yd heaped capacity, with a top opening of 11x7 ft and a body only 7 ft high that permit easy spotting and loading. Features cited by the company include: positive-power electric steering; 90-deg turning radius; and speeds from 2.77 to 25.27 mph.—*R. G. LeTourneau, Peoria, Ill.*



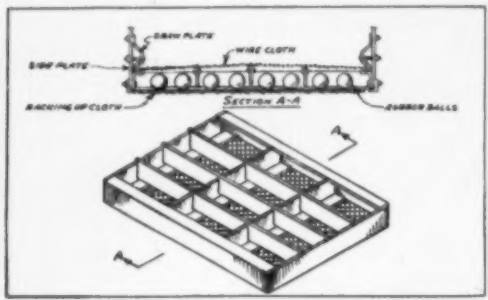
Scarifiers Work on Backward Motion (13)

Back-rip scarifiers made by Preco, Inc., and available through Caterpillar Tractor Co. can be mounted on the back side of all standard straight-blade bulldozers to rip the ground as the tractor backs up, floating on top as it moves forward. The teeth rip and loosen packed ground, rake out roots and rocks and smooth the ground to make forward blading easier and faster and fully utilize dead-head time without interfering with blading operations, it is said.—*Preco, Inc., Los Angeles 22.*



Controlled Cycle in Rotary Dump (14)

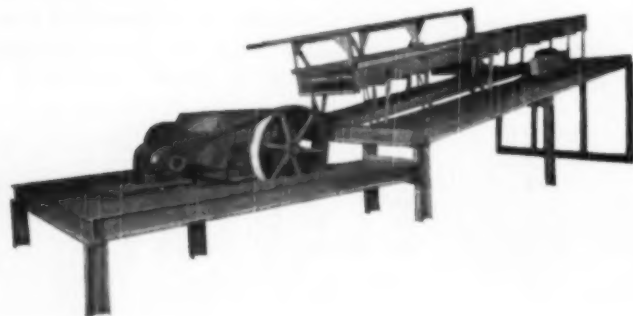
New design features have recently been incorporated in its rotary dump to provide more effective driving power and greater strength in rail and gear-ring mountings, the manufacturer reports. It is built to dump either single or double cars, coupled or uncoupled, at speeds necessary to meet tonnage requirements. Completely machined gear rings at each end eliminate all twisting strains from the frame and mesh with driving pinions to completely control the dumping cycle and eliminate all spillage, it is said.—*Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.*



Rubber Balls Facilitate Fine Screening (15)

New ball-tray unit installed underneath vibrating screens hold bouncing rubber balls that hit against screen cloth and tend to dislodge smaller particles sticking in the cloth or those adhering to the screen to cause blinding. Greater efficiency and more accurate screening is possible with the unit in screening fine coal, removing dust and screening damp or wet coal, the manufacturer says. The sub-deck tray has a floor of 1¼-in.-opening wire cloth and "rooms" 1 ft square to hold the balls, whose replacement cost is negligible, the company says.—*Screen Equipment Co., Buffalo 21, N. Y.*

Prefabricated Plants Prepare 80 to 200 TPH (16)



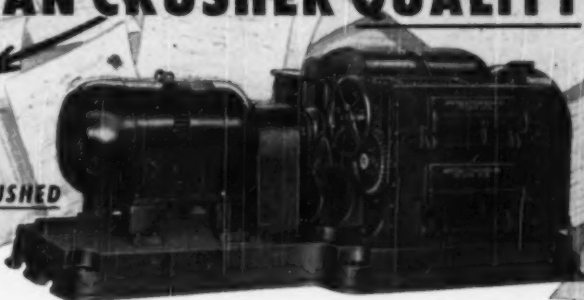
New MIN-PRO prefabricated coal-preparation plants have capacities of 80 to 200 tph and are built of welded structural steel, with all major sections bolted together to facilitate moving from job to job. The unit will pick, clean, crush and size mine-run in continuous operations, channeling output to a stoker-coal crusher or making a separation of lump and fines, the manufacturer states. MIN-PRO plants include: shaker screen, shaking picking table, refuse pans and conveyor, double-roll crushers, feed and discharge conveyors, storage hopper and feeder, structural-steel frame, floor plates, walls, roof, windows, motors, drives and inside wiring.—*Mineral Processing Equipment Co., Columbus 7, Ohio.*

COLD FACTS

on AMERICAN CRUSHER QUALITY

INDEPENDENT SURVEY
OF USERS

CHECKS TONS OF COAL CRUSHED
AGAINST
PARTS REPLACEMENT COSTS



29 Coal Mines and Power Plants Report . . .

- 1 A total of 61,161,372 tons crushed.
- 2 Average age of American Crushers at time of survey—9.35 years.
- 3 Average parts replacement cost \$.0012 per ton (Includes cost of standby parts not yet needed).

CONCLUSION:

AMERICANS CAN "TAKE IT"! NEEDING NEW PARTS LESS OFTEN, THEY KEEP OVERALL PRODUCTION EFFICIENCY HIGH.

HERE ARE A FEW CASE HISTORIES

A COAL MINE IN ILLINOIS reports 4,000,000 tons crushed over 10-year period by their American AC3-E Crusher—with a parts replacement cost of \$.0005 per ton.

AN INDUSTRIAL POWER PLANT IN WEST VIRGINIA has an American 38-S Crusher that has reduced 10,008,000 tons over last ten years. Parts replacement cost was only \$.0008 per ton.

A CENTRAL STATION IN NEW JERSEY crushed 6,000,000 tons over a 20-year period with their American 42-S. Parts replacement cost was only \$.00025 per ton. Crusher still going strong.

CRUSH COAL AT A
TOTAL COST OF
LESS THAN 1¢ PER TON

ORIGINAL COST of an American Crusher . . . plus
MAINTENANCE . . . plus POWER . . . plus INTEREST
ON INVESTMENT averages less than 1¢ per ton
crushed. The American Pulverizer Company has
many case studies to prove this fact.

Let an American Representative analyze your crushing problem. Write for details on the complete line of American Crushers.

American

PULVERIZER COMPANY

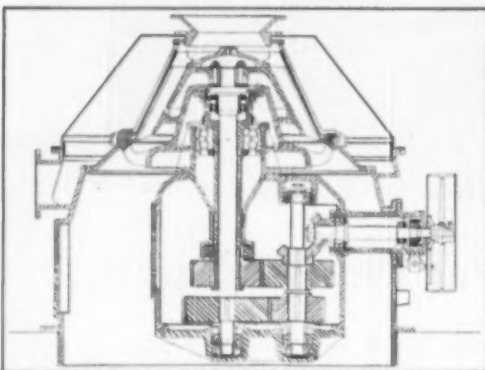
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**EQUIPMENT NEWS—For More Information,
Fill Out the Card Opposite**

Synchronous-Motor Control Protects All Types (17)

New Westinghouse "Slipsyn" full- or reduced-voltage synchronous-motor control units, for operating and protecting all types of synchronous-motor drives, are supplied as factory-wired units requiring only external connections for installation. A new-type ASR polarized slip-frequency relay provides automatic synchronization with maximum pull-in torque at the proper speed and phase relation, thus minimizing line disturbance, the company says. Pull-in protection stops the motor automatically if it pulls out of step. With optional Type BAL fuses, the units have interrupting capacities up to 250,000 kva, 4,800 v, three phase, 60 cycles.—*Westinghouse Electric Corp., Pittsburgh 30.*

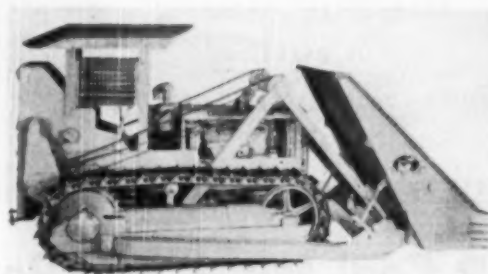


European Fine-Coal Drier Now in U. S. (18)

The Reinveld centrifugal fine-coal drier, in use in Europe for more than 20 yr with more than 250 units in operation, now is available in the U. S. A successful test installation of two driers at an Ohio mine has been followed by an order for four more, it is reported. Wet coal of 25 to 35% moisture feeds to the top of the unit in an annular space between the screen basket and scraper, both rotating in the same direction at high speed but with a differential motion in which the scraper is retarded. This motion transports the fine coal downward while it is spun and water removed through the screen openings. Compactly built, the unit requires only a 6x6-ft floor space, is 5½ ft high, weighs 11,000 lb and is powered from a V-belt drive. Screens are easily replaced by removing eight bolts on the steel cover and 12 bolts on the screen basket. End moisture of the cake ranges from 5 to 7%, depending on moisture content and fine slurry in the feed, it is said.—*M. G. Driessen (U. S. Agent), Pittsburgh 22.*

Drill Unit for Jeep Mounting (20)

New Model B-35 drilling unit (right), powered from the jeep take-off, is said to be stronger and more powerful than the previous B-27 model and weighs less than 1,000 lb. Designed for augering holes from 3 to 12 in in diameter, the unit has one side open for the entire length of the carriage to facilitate installation and removal of augers and has transfer guides made of improved roller chain, the manufacturer reports. Hydraulic controls are said to make for easy one-man operation. It can be converted from a vertical to horizontal position in a few minutes by a turntable, to permit augering holes for overburden blasting. As a prospecting drill, the unit can auger holes



Overshot Loaders for Utility Tractors (19)

Recent addition to the Austin line of overshot loaders is the Model 4-C, which is readily attached to various utility-sized tractors and is made in two heights, for either surface or underground operation. The loader has a rated capacity of 1 cu yd and a 20-sec loading cycle and will handle bank-run material at 125 yd per 50-min hr with no increase in fuel consumption over normal dozing operation, the manufacturer states. The surface unit has an over-all height of 15 ft 3 in and a dumping clearance of 8 ft.—*John Austin Inc., Denver, Colo.*



without using water to a depth of 100 ft through hard pans, shales and soft-stone formations, the company says.—*Mobile Drilling Co., Inc., Indianapolis, Ind.*

EQUIPMENT BULLETINS — Available Via the Postcard Below

(25) **ROOF-BOLTS AND ACCESSORIES**—Booklet 293, from Bethlehem Steel Co., Bethlehem, Pa., offers a well-illustrated description of the Bethlehem line of roof bolts, plates, ties, nuts, wedges and washers and includes detailed data on sizes, construction and installation methods.

(26) **UNIT WASHERY**—This new Bulletin 450, describing a Baum-type jig unit washery, has been prepared by McNally-Pittsburg Mfg. Co., Pittsburg, Kan., to include data and work sheets so that you can design your own coal-cleaning circuits. The envelope-type folder has detailed drawing sheet that shows how the washery can be added to a present building and also shows three basic washing circuits, with tonnage and explanatory data. You can use a cross-hatched drawing sheet also included for sketching a proposed circuit.

(27) **LUBRICATION ECONOMIES**—"Eleven Ways to Cut Production Costs" are graphically portrayed in a pocket-sized primer on lubrication published by the Alemite Div., Stewart-Warner Corp., Chicago 14. The booklet will be helpful to maintenance men and others responsible for the supervision of lubricant handling and presents specific examples of production or machinery economies attained through modern handling and application of greases and oils, along with a handy checklist of lubricant-handling methods.

(28) **LOADING MACHINES**—New Catalog 250 is said to be the most graphic and complete ever published on loading machines by Myers-Whaley Co., Knoxville, Tenn. It contains complete information and specifications for all models of Whaley "Automat" underground shovel-action loaders.

(29) **EQUIPMENT - HANDLING TRAILER**—Bulletin on the new Martin "Folding Gooseneck" trailer in capacities of 20, 27 and 32 tons, issued by Martin Machine Co., Kewanee, Ill., shows how the easy, one-man operation of this trailer does away with ramps in speeding loading or unloading of equipment such as heavy tractors, motor graders and shovels. Lower platform height is said to make for increased roadability and greater clearance.

(30) **PORTABLE MINE BLOWERS**—New Joy Mfg. Co. Bulletin J-607 covering Axiavane portable mine blowers describes in detail the complete line of vaneaxial-type blowers from 1/4 to 5 hp, with performance through tubing of various lengths and diameters given in both graph and tabular form. Blowers may be driven by air or electric motors and can be supplied as permissible units if required.

(31) **CRAWLER TRACTORS**—New 24-p catalog features the A-C HD-19 20-ton crawler tractor with torque-converter drive, said to be the first new development in crawler-tractor power transmission since before the war. Offered by the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., the booklet includes detailed information on operating and performance features, track design, construction of the GM two-cycle diesel engine, allied equipment and specifications.

(32) **MINING - TOOL MAINTENANCE**—To help you keep carbide-tipped mining tools in top condition, Carboloy Co., Inc., Detroit 26, offers a 22-p manual-catalog (No. CM-100). It provides sharpening information on such Carboloy tools as coal-cutter bits, finger bits, auger bits, pin-timbering drills, etc., and includes available

sizes, specifications and prices.

(33) **CAR UNLOADER**—The simplified action and features of the Kinney car unloader, said to permit one man to unload a 70-ton hopper car of frozen coal in 20 min or less, is graphically illustrated in Bulletin 2-50-KCU available from Heyl & Patterson, Inc., Pittsburgh 23.

(34) **MINING-MACHINE CABLE**—Construction and features of 6x36 Seale American Cable Tru-Lay preformed improved plow-steel cable said to pay dividends in extra production, safety and dependability are discussed in a new bulletin issued by the American Cable Div., American Chain & Cable Co., Inc., Wilkes-Barre, Pa.

(35) **INSTRUMENT RENTAL**—Catalog offers complete details of a newly established instrument-rental service that provides use of recording ac ammeters, ac-dc voltmeters and wattmeters, as well as current transformers, for various periods without the necessity of investing in the equipment. Booklet from InstruRental Co., Washington 5, D. C., includes specifications and descriptions of the instruments and rental charges.

(36) **EYE - SAFETY POSTERS**—Safety glasses, not personal glasses, should be worn on the job by workers, say a new series of 10x13 1/4-in posters now obtainable from the American Optical Co., Southbridge, Mass. Designed to encourage workers to wear goggles, the posters point out that Rx safety glasses protect workers' eyes, which personal glasses don't do, and that personal glasses are exposed to hazards that may chip, crack or pit the lenses.

(37) **TRACK CLEANER**—How the Canton track cleaner is built and how it operates to save labor, reclaim

Will These New Products Work at Your Operation?

YOU MAY BE MISSING a good bet for more efficient operation if you have overlooked any of the new equipment described on pp 140 to 173, inclusive. They're the latest products announced by the manufacturers and have been specially arranged to simplify your quick check of those useful to you. For example, here are just a few of the many interesting items you'll find on these pages.

Roof-Bolting Drilling Units.....p 140
Two-Way Mine-Rescue Phone.....p 144
50-Ton Coal Hauler.....p 144
Preparation Units.....pp 144, 146, 148
Trailing-Cable Shock Absorber.....p 150
Automatic Sump-Pump Switch.....p 152
Mine- and Railroad-Car Block.....p 154
High-Powered Mine Headlight.....p 166
Wire-Rope Splicing Machine.....p 170
Dry Selenium Rectifiers.....p 173

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... TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, tear out and mail.

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. July, 1950

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Company.....
Address.....

EQUIPMENT BULLETINS — Available Via the Postcard Below

spillage and increase haulage safety in cleaning track at the rate of 1 tpm is thoroughly covered in bulletin issued by the American Mine Door Co., Canton 6, Ohio.

(38) CONVEYORS — Copies of the *S-A Conveyor*, a magazine published by Stephen-Adams Mfg. Co., Aurora, Ill., now are available to those interested in detailed operating information on various types of conveyor installations and applications. A request will put you on the list.

(39) MOTORS AND GENERATORS — Stock List 1622 issued by Electric Generator & Motor Co., Cleveland 14, provides a detailed listing of "guaranteed" rebuilt motors, generators and other electrical equipment available.

(40) BUILDING AND PLANT CONSTRUCTION — Booklet, "The McCloskey Story," available from the McCloskey Co., Pittsburgh, graphically illustrates the construction and features of the company engineered "Rigid-Frame" structures. They are said to require no angles or trusses, thus providing more headroom up to the ceiling and facilitating the installation of equipment close to the roof or at other desired points. The design reportedly was successfully applied recently in cleaning-plant construction.

(41) CONCRETE - FLOOR RESURFACING — Folder, "No Floor Chopping," explains the simple steps in using Stonhard Resurfacer to patch or overlay worn and rutted floors of all types: concrete, brick, asphalt, wood or even composition. Readily applied by your own workmen, Stonhard makes a smooth, tough, resilient, non-skid, spark-resistant surface that withstands the heaviest trucking and

assures safe and comfortable footing, according to the manufacturer, Stonhard Co., Philadelphia 23.

(42) TRUCK-FLEET OPERATION — Publication of the *International Tröl* magazine for truck-fleet owners by the International Harvester Co., Chicago 1, has been resumed with the May, 1950, issue. It will be mailed six times a year to owners of five or more trucks. The magazine features concisely written trucking articles, and news and activities of truck transportation throughout the world.

(43) AIR HOSE — Hewitt Rubber Div., Hewitt-Robins, Inc., Buffalo 5, has issued envelope-sized Bulletin 129 explaining the design, construction and rubber compounds of Conserve, described as a general-service air hose with a rayon-cord carcass.

(44) STEAM, AIR, GASOLINE TRAPS — New 32-p Catalog 250, W. H. Nicholson & Co., Wilkes-Barre, Pa., describes five types of thermostatic steam traps; two types of expansion steam traps; three types of weight-operated traps for steam, air and gasoline; piston-operated steam traps; and three types of steam, air and gas separators. It provides capacity tables, installation diagrams and data, charts and formulae for determining the proper size.

(45) COAL- AND MATERIALS-HANDLING EQUIPMENT — Bulletin 144, "Wellman Will Build It," illustrates the wide range of equipment, construction and engineering service available from the Wellman Engineering Co., Cleveland 4, Ohio. Shown are actual installations of various types of coal-handling machinery, special cranes, hoists, buckets, coke-oven and steel-plant equipment, etc.

(46) ELECTRIC MOTORS — Bulletin EM-4-812 on polyphase electric motors published by A. O. Smith Corp., Los Angeles 22, describes its line of 1 to 75-hp horizontal motors, illustrating construction and operating features.

(47) TRACTORS — Pocket-sized 20-p booklet featuring Allis-Chalmers' complete industrial tractor line contains specifications and a brief description of each power unit, wheel tractor and crawler tractor. The new catalog emphasizes wise use of equipment and the importance of buying the right equipment to "fit" your job. Issued by the A-C Tractor Div., Milwaukee, Wis.

(48) CONCRETE CONSTRUCTION — Booklet, "15 Steps to Better Concrete Construction," prepared by Silka Chemical Corp., Passaic 27, N. J., specifically for architects, consulting and construction engineers, describes use of Plastiment retarding densifier to render structures resistant to water, cracking and absorption, and discusses 14 additional engineered construction materials for coating, sealing, hardening and repair work on concrete and masonry.

(49) CENTRALIZED LUBRICATION — Booklet, "Studies in Centralized Lubrication," Farval Corp., Cleveland 4, presents examples of savings obtained with installation of Farval equipment in the elimination of machine down time for lubrication and repair, with correspondingly increased production.

(50) DRAINAGE STRUCTURES — Folder describing the strength advantages of Armo metal drainage structures published by Armo Drainage & Metal Products, Inc., Middletown, Ohio, shows how flexible metal underground structures can support heavy live and dead loads without failure and outlines the types suitable for various installations and kinds of service.

(51) PROTECTIVE PAINT — Two new bulletins offered by Joseph Dixon Crucible Co., Paint Div., Jersey City 3, N. J., outline the application and performance of Dixon silica-graphite paint and primer, described as a long-lasting and rust-resistant coating for metal structures.

(52) MERCURY CLUTCHES — Complete line of mercury automatic clutches is described and illustrated in three new bulletins from Automatic Steel Products, Inc., Canton 6, Ohio. Bulletin 216 covers the mercury clutch in general, listing and illustrating various applications; Bulletin 217 deals with applications on gasoline engines; Bulletin 218 covers electric-motor installations.

(53) DUST COLLECTORS — Bulletin from Bubar Dust Systems, Inc., Old Lyme, Conn., describes the operation of Bubar dust collectors, said to offer low draft loss and high efficiency on various types of boiler installations.

USE THIS CONVENIENT CARD

... TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue, circle item numbers, tear out and mail.

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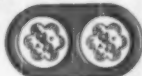
3

POINT IMPROVEMENT

IN HAZACORD TWIN PARALLEL
MINING MACHINE CABLE
SETS NEW STANDARDS FOR

- SAFETY,
- SERVICE LIFE,
- FLEXIBILITY

■ **INCREASED SAFETY.** See how the tough, flame-resistant Hazaprene ZBF sheath completely encases each insulated conductor, forming a solid Hazaprene barrier between the power and grounding conductors of Type G, and between the power conductors of Type W. This new separating wall prevents short-circuiting... adds substantially to the cable's overall flame-resistance. Internal rubbing of cable components is eliminated because the interlocking construction of insulated conductors, grounding conductor, reinforcing cord and Hazaprene sheath forms one integral mass.



■ **EXTENDED SERVICE LIFE.** Notice the non-rotting, non-rubbing moisture-resistant open bonded cord over each insulated conductor. This reinforces the heat-resistant, long-aging rubber insulation... and locks the insulated conductors within the sheath.

■ **GREATER FLEXIBILITY.** Note the flat, braided grounding conductor which permits compact cable design for maximum reel capacity... provides complete flexibility without strain for the highest speed reeling applications.

Forget whatever you've learned to expect in the way of cable life and all-around performance from twin parallel mining machine cable in shuttle car service or other fast-reeling applications. You can set your sights higher with Hazard's new Type G or W. And in addition to the "inside" improvements described above, don't forget the "outside" advantages you get with the Hazaprene ZBF Sheath. This tough, Hazard-developed neoprene compound combines greater flame-resistance and durability than

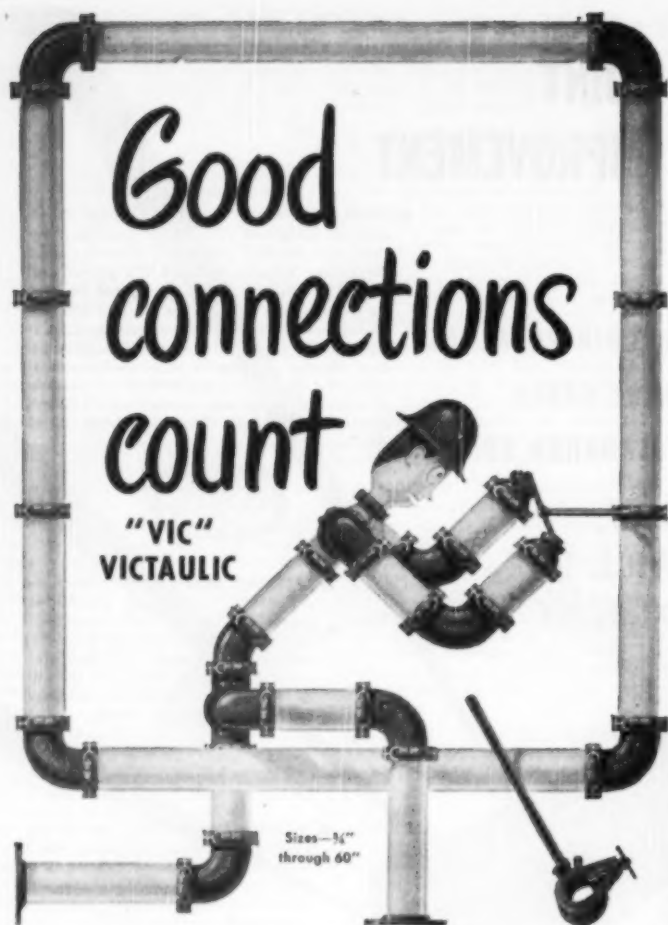
was ever before possible. Hazacord Twin Parallel Mining Machine Cable exceeds the flame-test requirements of the U. S. Bureau of Mines and Pennsylvania Department of Mines—"P-104 BM" is molded into the sheath of every cable at frequent intervals.

Write today for further information about the new Hazard twin parallel cable or ask your Hazard representative. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

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vacuum, strain, or pressure conditions.

AND grooving those pipe ends is a cinch the Victaulic Way . . . "Vic-Groover" grooves 'em automatically in *half the time* of a conventional pipe threader.

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New Equipment . . . Cont'd



Trailing Cables Cushioned (55)

New Mesco shock absorber for use on trailing cables in mines is designed to "dead-end" cables and provide slack when connecting cables to junction boxes or any source of power. A spring within the case takes up sudden jerks or load pulls and helps prevent breaking of the cable, it is said. The unit illustrated has a four-bolt cable clamp for use on shuttle cars, but can also be equipped with a hinge-type clamp adaptable to any-type trailing cable used on cutting machines, machine trucks, portable air compressors, loading machines, rock drills or rock-dusters. A hinged link permits the clamp to swivel in any direction, and the shock absorber can be securely bolted to the roof or fastened by a chain to timbers or the rail.—Moseback Electric & Supply Co., Pittsburgh 3.



Flexible Tubing for Mines (56)

Said to be particularly adaptable to mine ventilation, "Spiratube-M" is a wire-reinforced duct that features light-weight, high retro-actability and simplified storage, speedy coupling, built-in suspension hooks and flexibility that permits bends without special elbow fittings. Covered with a jute impregnated with synthetic rubber, the tubing is available in diameters from 6 to 30 in., in 25-ft lengths. The reinforcing is a rust-proof spring-steel helical core. Similar tubing without the reinforcing is known as "Airtube" and has the same features. It is available in 25-, 50-, and 100-ft sections, 8-through 36-in diameters. Bulletin 5-4 provides detailed data.—Flexible Tubing Corp., Branford, Conn.

FOR HEAVY DUTY CONVEYORS...

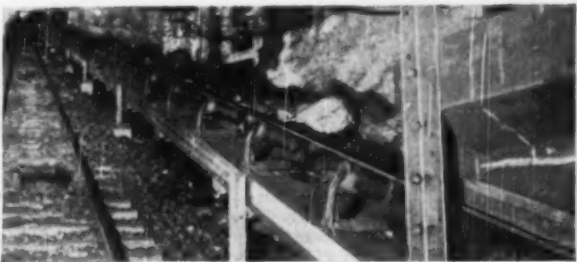
**IT'S
TIMKEN®**



For over a quarter of a century, Timken® tapered roller bearings have given long, trouble-free service in heavy duty conveyors—just as they have throughout all industry. A typical example is this conveyor that handles

1 million tons of ore per year—about one-third of the Cuyuna range output! With Timken bearing equipped Stephens-Adamson Company idlers, this installation assures a steady flow of iron ore from the pit.

**AND
TIMKEN...**



Timken bearing equipped Rex idlers speed up the job of bringing coal to the pit head in this mine installation. Timken bearings have unusual load-carrying capacity—take radial and thrust loads in any

combination. Idler friction is practically eliminated. Belt wear is reduced. And Timken bearings permit tighter closures to keep lubricant in, dirt and moisture out. Maintenance is reduced to a minimum.

**AND
TIMKEN
AGAIN!**



Here's one of the four conveyors at the Blue Ridge Stone Company's quarry at Roanoke, Virginia. Using a total of 8,566 Timken bearings in troughing idlers and return rolls made by Barber-Greene Company, the system is 3,793 feet long. Thousands of miles of

conveyors are now equipped with Timken bearings. The reason: *There's no other bearing with so much to offer—no other bearing so fully proved!* The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*Wherever the going's tough
industry turns to*

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL ☐ NOT JUST A ROLLER ☐ THE TIMKEN TAPERED ROLLER ☐ BEARING TAKES RADIAL ☐ AND THRUST ☐ LOADS OR ANY COMBINATION ☐



Designed FOR THE MINE!

Here's the kind of job that calls for Collyer *Twin Parallel Type G Mining Cable*—specially constructed to take the punishment of trailing cable service. Look at the power-protecting features of this heavy duty cable:

FLAT CONSTRUCTION for wear-free flexing and easy reeling

PROTECTED GROUND WIRE for positive grounding of off-track equipment

NEOPRENE JACKET — proof against flame, abrasion, chemical action, and oils

RUBBER INSULATION of high dielectric strength for greater corona resistance and full moisture protection . . . highly resilient to cushion against sharp or crushing blows

MEETS REQUIREMENTS of Penn. Dep't of Mines and U. S. Bureau of Mines for flame resistance — carries approval number P107 embossed on cable sheath, assuring safe performance on every installation.

No wonder Collyer Type G is so widely used for trailing cable service in mines. It will pay you to consult with us on your mining cable requirements. Write for recommendations. Collyer Insulated Wire Co., 245 Roosevelt Ave., Pawtucket, R. I.

Represented by

G. H. ZIMMERMAN CO., P. O. Box 1306, Charleston 25, W. Va.
JOHN E. WALKER, 264 Roosevelt Ave., Freeport, N. Y.

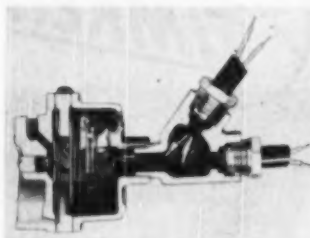
CHOOSE

Collyer
MINING CABLES



Accurate Galvanometer (57)

A new adjustable blasting galvanometer, said to give accurate resistance readings in ohms even when its activating cell is not at full strength, offers extra safety and control in testing blasting circuits before firing, the manufacturer reports. The Atlas No. 4 blasting galvanometer is calibrated to an accuracy of less than 1/4-ohm resistance, permitting checking of small resistances such as a single blasting cap. In addition, it may be used as an ammeter in the detection of stray currents, affording extra protection before hooking up the circuit. Three terminal posts marked for connections for three types of reading simplifies operation.—Atlas Powder Co., Wilmington, Del.



Switch Controls Sump Pump (58)

New Kenco Floatless Liquid-Level control switch, featuring an entirely different principle than most sump-pump switches, cannot fail to operate as long as there is water and electric power, according to the manufacturer. The unit is completely submersible, features corrosion-resistant bronze construction, and has no moving parts exposed to water. The switch is connected by a pipe nipple to the discharge chamber of the Kenco Floatless submersible sump pump and also can be installed on various makes of electric pumps. It automatically shuts off when the pump draws air, thus reducing the possibility of water or foreign material fouling the switch mechanism, the company says. A manual through-cord switch provides either manual or automatic operation. The switch can be installed to actuate a sump pump when water rises to a height of only 8 in. All wiring, packing and connectors are made of synthetic rubber, oil, gasoline, water- and acid-resistant. Circular 10 available.—Kenco, Inc., Elyria, Ohio.

TWO CLARKSON

Offer New Efficiency in Coal Loading



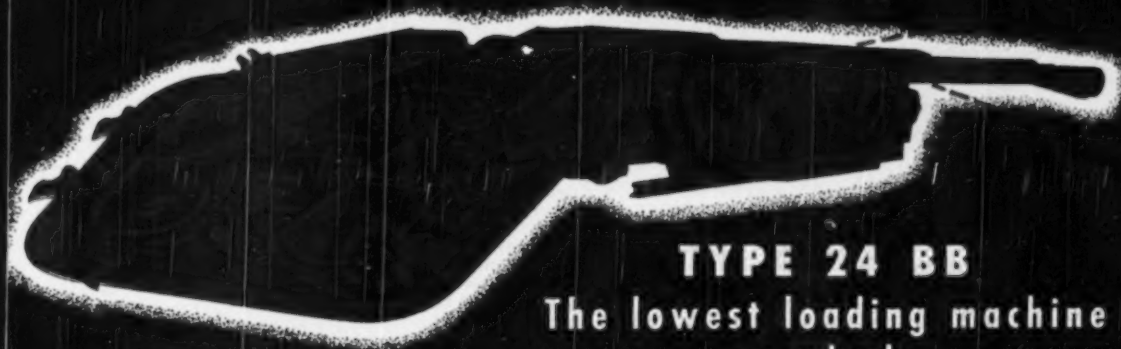
TYPE 28 FA UNIVERSAL

The only completely mobile face loader on rubber tires

Front and rear conveyors flex horizontally and vertically with push-button controls. One 50 HP motor.

Completely flexible — Front head and chassis both swing to permit closer work around face timbers.

Front head raises and lowers 26" above and 18" below floor line. Loader has high road clearance.



TYPE 24 BB

The lowest loading machine on wheels

Conveyor in traveling position well below trolley wires even in very low coal — can only 23' from rails.

Powerful, compact digger head for tight spots. Hydraulic controls centralized for fast, one-man operation.

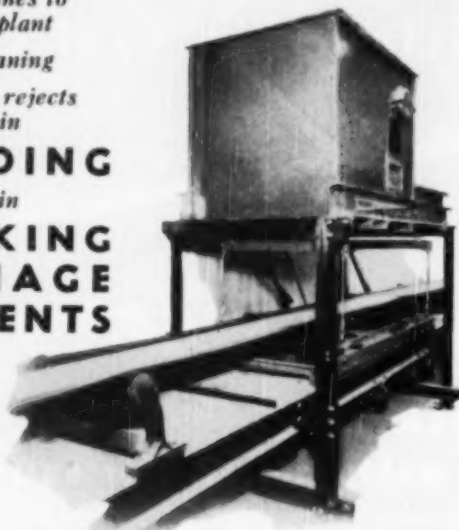
Telescopic jack adjustable to any car height — with oversize cylinders for low hydraulic pressure.

The **CLARKSON**
MANUFACTURING CO.
Nashville
Illinois

Meeting "New Horizon" demands for better production methods

- 1 From mines to washing plant
- 2 After cleaning
- 3 weighing rejects and in

BLENDING
and in
CHECKING
TONNAGE
PAYMENTS



Modern Mines use the

WEIGHTOMETER

Reg. U. S. Pat. Off.

All these things a WEIGHTOMETER will do in your cleaning plant add up to **LOWER COST PRODUCTION**. Leading producers use WEIGHTOMETERS for accurate, speedy **WEIGHING WHILE CONVEYING**, without interruption to conveyor service. Applicable to existing belt conveyors or furnished complete with short pivoted conveyor. Graphs of hourly or daily tonnage, carried continuously or intermittently, produced on your desk if desired. Moving loads of coal weighed and recorded on belt conveyors underground, up a slope, or near the tippie. Write today for Bulletin 375 for further details.

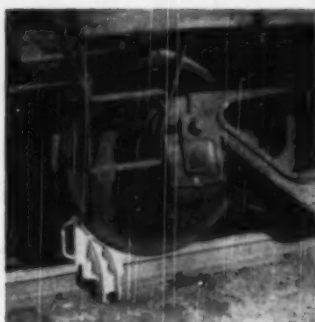
● AND THERE'S ALSO THE **FEEDOWEIGHT** . . .

Reg. U. S. Pat. Off.

The FEEDOWEIGHT gives you absolute control in **BLENDING** and **MIXING** coal, plus accurate continuous weight totalizing in the same operation. It's just a matter of automatically controlling **EACH FEED GATE** by **WEIGHT** without retarding the scale beam. Write today for Catalog No. 551 to find out how one or more of these units can most effectively and economically be used in your cleaning plant.

MERRICK SCALE MFG. CO.

173 Summer St., PASSAIC, NEW JERSEY



Car Block Locked to Rail (59)

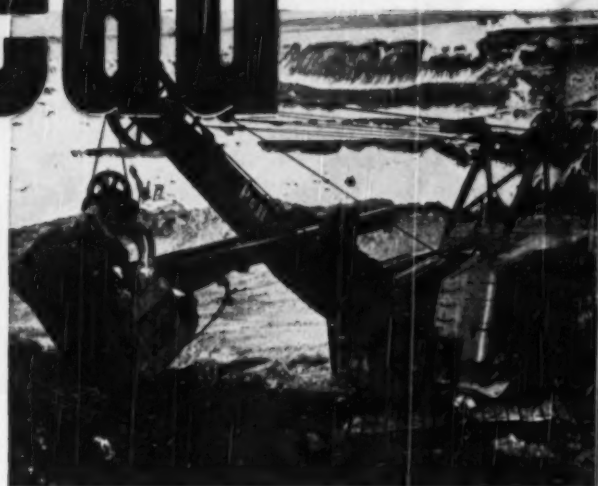
For use in preventing railroad- or mine-car movement, the Nolan Model C car block, made from heat-treated alloy steel castings and drop forgings, is designed to permit quick, easy application. The block is locked to the rail with a cam to prevent movement by the car. Model No. 1 fits rail 40 to 85 lb.; Model No. 2, for rail 90 to 175 lb.—Nolan Co., Bowerston, Ohio.



"Guillotine" Cuts 1-In Rod (60)

New Portable hydraulic cutter, the Manco Guillotine Model 20-D, is said to be capable of quickly cutting reinforcing rod, stainless steel and Monel rod of $\frac{3}{4}$ -in diameter, 1-in mild-steel rod and soft chain, and $\frac{3}{4}$ -in hard chain. The cutting unit has an open "C" frame anvil that also will accommodate hex-shaped and square material for cutting. The basic Guillotine cutting unit is available with any of four Manco pump units, the Manco air-hydraulic pump shown, a Manco electric-hydraulic pump unit, a separate manually operated pump for non-positional use in the field or an integral hand pump. The Manco Guillotine is rated at 22½-ton thrust and is easily portable, weighing only 45 lb with integral hand pump. Bulletin G-20 available.—Manco Mfg. Co., Bradley, Ill.

Low costs ahead



with **P&H** ELECTRIC SHOVELS

Better shovels mean better production in every way. And here's another team of P&H Electrics that are proving it. They're faster, of course. P&H Magnetorque® Hoist gives you smoother, livelier dipper action with electro-magnetic power. There's no friction, no wear.

You'll find some other important differences in P&H design . . . including the husky all-welded construction that gives you greater strength to withstand shock loads—and the increased electrical efficiency that gives kilowatts a new incentive. They all add up to the steady, dependable operation that lets you maintain schedules and cut tonnage costs for years to come.

On a major investment of this kind, you should *know* how much more P&H Electric Shovels give you. Ask for the facts. Write today!

*Trade-mark of Harnischfeger Corporation for electro-magnetic type clutch.

Here's another team of P&H Electric Shovels at work on the Mesabi Range. They're owned by a prominent mining company at Virginia, Minnesota. At left is a P&H Model 1400 (4 cu. yds.). At right is a new P&H Model 1055 Electric Shovel (3 cu. yds.) which incorporates all of the famous P&H features.



Every third P&H Electric Shovel sold is a repeat order

FACTORS • OVERHEAD CRANES • HOISTS • ARC WELDERS and ELECTRODES • SOIL STABILIZERS • CRAWLER and TRUCK CRANES • DIESEL ENGINES • CAME LOADERS • PRE-ASSEMBLED HOMES

SPEED YOUR PRODUCTION PROGRESS

WITH

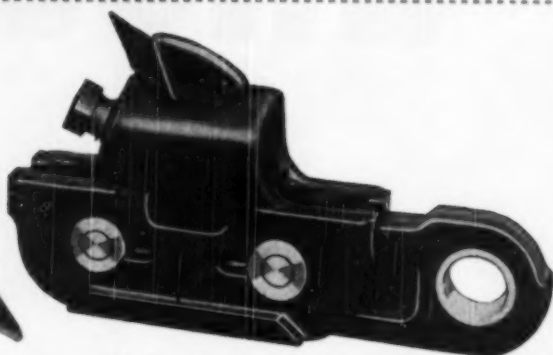
PROX

ON THE BANKS OF THE HARASH—SINCE 1879



DUOMATIC CHAIN *using conventional bit*

A strapless cutter chain that has no bulky heads. Takes any bit with a $\frac{3}{8}$ " x 1" shank. Long life and no whippage coming off of Drive Sprocket. Repairs may be easily made in minutes on the job. Hardened pins and bushings for longer journal wear. Easily repaired with simple locking rivet. Eight or ten positions.

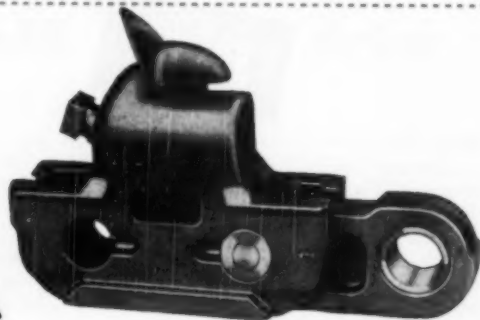


DUOMATIC CHAIN with DUO BITS

The Prox Duo Bit is designed to give coarse cuttings—yet it is rugged enough to withstand the hardest of cuttings. It is held by only one moving part—no other parts for you to keep in your stock bins. Eight or ten positions.

DUOMATIC CHAIN with Tool Steel Bits

Assures uniform bit gauge. May be changed quickly. Circular back edge is strongest possible design. Each of these tool steel points cuts at least as much as a hard tipped ordinary mine bit



PROX DUOMATIC CHAINS offer you these advantages

- Of strapless design—it is rigid and compact.
- Interlocks are machined—pins and bushings are hardened for longer cutting life.
- Sumps easier—cuts easier thereby eliminating the cloud of dust normally created in the cutting operation.
- No bulky heads that must be pulled through the cutting operation.
- No chain whippage as it comes off the drive sprocket.
- Parts may be easily replaced in a few minutes on the job.

GET LOWER COSTS-GREATER TONNAGE
WITH THE AID OF

PROX
ON THE BANKS OF THE WABASH—SINCE 1873

CUTTER BARS



INSIDE VIEW SHOWING CONSTRUCTION OF PROX 7-AU & 10-RU CUTTER BARS

The sturdiest Cutter Bars built, for the modern cutting machines of today.

The Cutter Bars that will stand up under the abuses given them today, no bending or breaking, giving you years of trouble-free service.

NOTE—The reinforcing side bars built in all Prox Cutter Bars, which proves they are the most rigid Cutter Bars manufactured today.

Prox Cutter Bars are furnished for using three types of cutter heads, whichever type the customer desires: The Prox Roller Cutter Head, the Prox Semi-Circle Cutter Head, and the Prox Semi-Circle Shoe Type Cutter Head.

Bars are furnished equipped with water upon request for a slight additional cost.

Prox also builds Cutter Bars for CE-7 and 7-B Sullivan mining machines.



INSIDE VIEW SHOWING CONSTRUCTION OF PROX 7-AU & 10-RU CUTTER BARS

The Prox 29-U Cutter Bar is of the same sturdy construction as the 7-AU and 10-RU and can be furnished with any of the above-mentioned heads.

Bars are furnished equipped with water upon request for a slight additional cost.

Prox also builds bars for 35-B, 29-LE, 29-L, and 29-C Jeffrey mining machines.

Send your inquiries direct to the home office.

This organization has directed its efforts, for the past 75 years, to economical, faster and more efficient coal production.

PROX engineers have, through close contact with mining problems, continued to improve the designs and the working ability of Chains, Bits and Bars in keeping with the industry's progress.

Today PROX has to offer in this equipment, precision products of unexcelled quality. Here is dependable performance—added safety—extra long service life and quick, easy maintenance. Here is equipment in step with the industry's present progressive move. Here is equipment that will aid materially in the industry's efforts to attain greater production and higher quality at less cost.

PROX products are truly tested products, for in the past years under varying conditions, they have demonstrated their value in doing a fully efficient job. This equipment today takes its part with other modern production equipment, in maintaining top results.

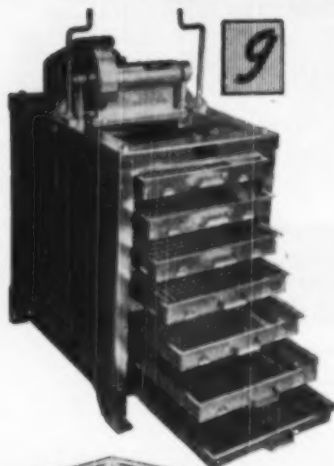
Now is the time to find out the full facts about PROX products. We will be glad to talk it over with you when you are ready. We suggest that you send for our descriptive circular.

PROX
ON THE BANKS OF THE WABASH—SINCE 1873

FRANK PROX COMPANY
TERRE HAUTE, INDIANA

Now Available to the **COAL**
INDUSTRY with either
Round or Square Screen Openings

GILSON *Mechanical* TESTING SCREEN

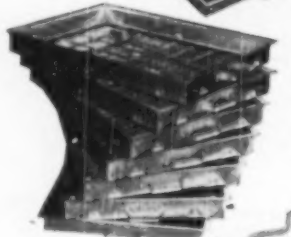


The GILSON Testing Screen gives you prompt, accurate information about:

1. Your finished product
2. Your raw material
3. Semi-processed material at any stage

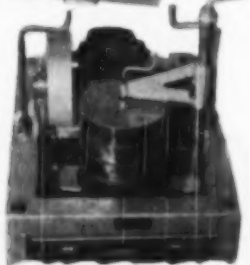
Knowing these facts about your product—the fluctuating changes in your operations enable you to operate your plant intelligently and more economically.

This machine is designed for the efficient sizing of test samples. It accommodates samples up to one cubic foot, making from two to seven separations simultaneously, in five minutes or less.



The screen trays and dust pan are sturdy, built to stand rough usage—will not bend or warp. Screen surfaces (ASTM standards) are held under tension by a tightening arrangement which insures proper vibration and permits easy replacement.

As standard screen trays are usually too large for testing very fine materials, an attachment (shown below, left) may be furnished for using eight-inch testing sieves in conjunction with the vibrating unit.



Where exacting specifications are required the Gilson Screen eliminates guesswork—avoids errors and provides facts which reduce operating delays.

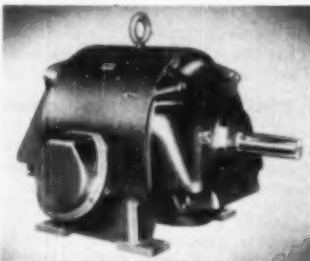
For fast, accurate sizing from 4" to 200-mesh specify a Gilson Testing Screen.

GILSON SCREEN CO. BOX 186
MERCER, PENNA.



Brake-Motors Up to 20 Hp (61)

All types of General Electric Tri-Clad motors up to 20 hp, 90 lb-ft static torque, now are available with a explosion-proof, electrically operated magnetic brake manufactured by the Stearns Magnetic Mfg. Co. For flexibility, brake combinations are selected to operate at 100 and 150% of full-load motor torque. A single adjustment nut sets the torque for specific load conditions, thus permitting operation below maximum rated torque to conserve brake linings and lengthen brake life. In normal operation, the company says, the only maintenance required is the simple screwdriver adjustment to compensate for wear, when necessary as signalled by wear indicator viewed through a plastic window. All brakes are totally enclosed, with the brake cover sealed to the motor housing. The brake will continue to hold even if power fails, it is said, because of its spring-set, solenoid-release design. Bulletin GEA-5464 available.—General Electric Co., Schenectady 5, N. Y.



New Splash-Proof Motors (62)

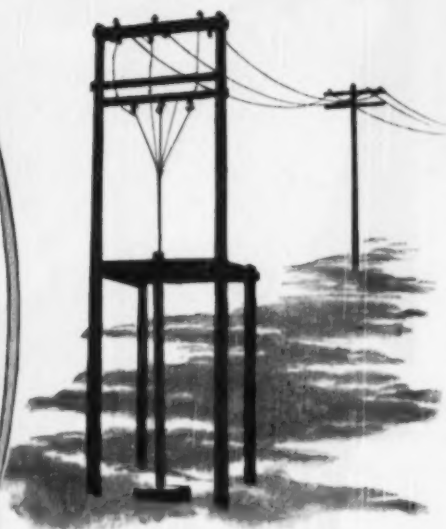
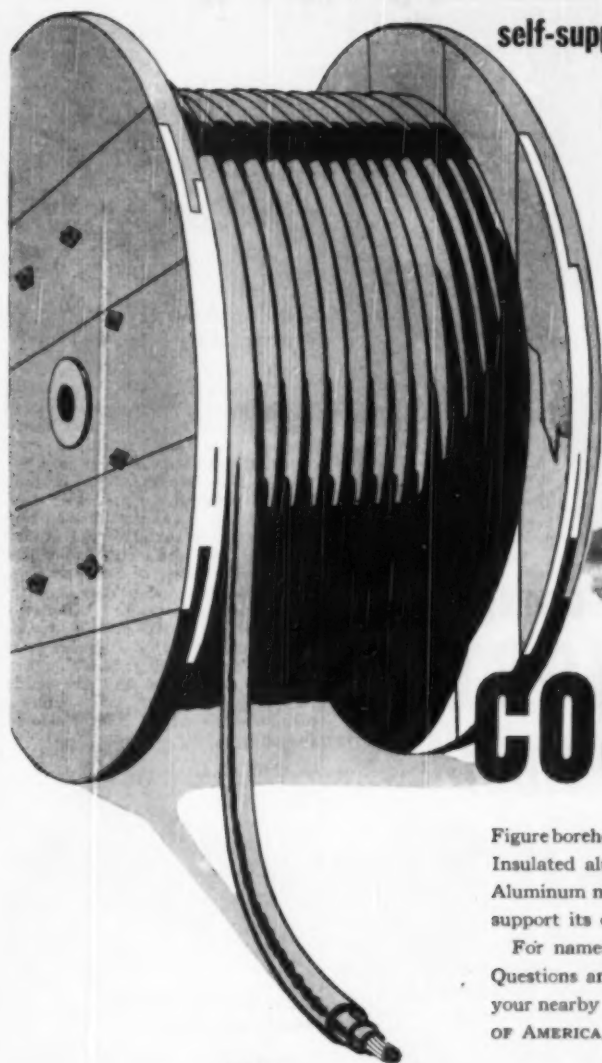
New Westinghouse splash-proof Type CSP Life-Line induction motors are squirrel-cage motors designed for constant-speed applications both indoors and outdoors, and are said to be

**WANT Bulletins or More
Data on Products Described
Here? Just Circle the Num-
bers on the Card Facing p
148 and Mail!**

Aluminum

borehole cable

self-supporting without reinforcement...




costs less

Figure borehole cable both ways—in aluminum and in copper. Insulated aluminum costs *far* less than *armored* copper. Aluminum needs no supporting armor because it can easily support its own light weight in boreholes of great depth.

For names of manufacturers and copy of "Installation Questions and Answers on Alcoa E.C. Aluminum," phone your nearby Alcoa sales office or write ALUMINUM COMPANY OF AMERICA, 1787G Gulf Building, Pittsburgh 19, Penna.



Aluminum Conductors

of ALCOA  ALUMINUM are made by leading manufacturers

FOR Safest INSTALLATION OF ROOF BOLTS



ALWAYS USE DEPENDABLE DUFF-NORTON Mine Roof JACKS

Don't take chances! Be assured of maximum safety with Duff-Norton mine roof jacks as temporary supports, when installing split rods, expansion bolts and all other type suspension supports in your mine. For complete data on mine roof and other Duff-Norton Mine Jacks...

See your local distributor or write for the "Handy Guide for Selecting Duff-Norton Mine Jacks."

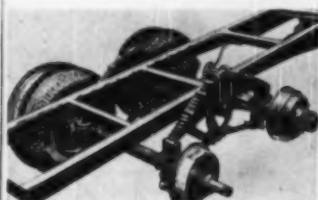


THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.

"The House that Jacks Built"

fully protected from dripping or splashing liquids by solid rolled-steel frames and baffles in the end brackets. The motors are equipped with pre-lubricated bearings, with no lubrication required for the life of the bearing. They are available from 7½ to 100 hp; 60, 50 and 25 cycles; 208, 220, 440, 550 and 2,300 v; in NEMA standard dimensions, Frames 364 through 445.—Westinghouse Electric Corp., Pittsburgh 30.



Trailing Axle for Trucks (63)

New design improvements have been announced in the Little Giant "Trailing Axle," which are said to bring greater strength, less maintenance cost and increased load capacity to two models designed for 1½ to 5-ton trucks. The Trailing Axle is designed for use with two-axle trucks, to almost double load capacity by the installation of a third axle and wheels directly behind the rear driving axle, the company says. Oversized axles and heavier castings are augmented by the new, completely rubber-bushed ends of the torque arms which eliminate all shock from starting and stopping, replacing former bronze bushings and eliminating four grease points for simplified maintenance.—Little Giant Products, Inc., Peoria, Ill.



New-Design Plate Magnets (64)

An entirely new and improved group of non-electric Alnico plate magnets for separation of tramp iron from materials in process are known as "Atomagnets" and are available in three models, each with a different magnetic strength and in a full range of sizes. Magnetic strength greater than any other magnets comparable in size, type and cost, lighter weight and more streamlined design are features cited by the manufacturer. Installations can be made on chutes,

Euclid.. *Specialist*

IN OFF-THE-HIGHWAY HAULING EQUIPMENT



Built by a pioneer manufacturer of earth moving equipment, Euclids incorporate the know-how of years of experience. Every Euclid model is engineered specifically for off-the-highway work; all of the production and service facilities of Euclid are devoted to this type of equipment.

Heavy-duty design and construction throughout assure long life and dependable performance... more loads per hour and more profit per load

on the toughest jobs. Some of the Euclid-built features are the planetary type drive axle, frame and body on all models, and double-acting hydraulic hoist for Rear-Dump and Side-Dump "Eucls".

Owners can depend on Euclid's world-wide distributor organization for parts and service when and where they are needed. Call or write your Euclid Distributor for complete information on models best suited for your job requirements.



The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

EUCLIDS   *Move the Earth*

Only CARLON Pipe



* *The first real pipe that is plastic!*

ONLY CARLON PLASTIC PIPE combines the features of flexibility, light weight, absolute corrosion resistance, durability, low-cost installation, and long service life to solve your mine piping problems. This new pipe has been developed to handle sulphurous waters, alkalis, and metallic salts, and it has a projected, trouble-free service life many times that of metal pipe.

FLEXIBLE CARLON "E" PIPE follows entry direction and conforms to irregular surface contours. Furnished in lengths up to 400 feet, depending upon diameter, CARLON pipe eliminates many fittings required by other mine pipe. It can be installed quickly and easily, even under adverse conditions, for both permanent and temporary operations.

CARLON "E" MINE PIPE is guaranteed against rot, rust, and electrolytic corrosion. Operational tests have proven that CARLON cuts installation, maintenance, and replacement costs to minimum. In one of the country's largest mines, for example, an installation of CARLON "E" has been in continuous service for over 2 years with no signs of wear or deterioration from handling highly corrosive mine water. The Superintendent of this mine estimated that iron pipe in this installation would have been replaced at least seven times during the same interval.

Specify the Pipe with the Stripe!

CARLON "E" PIPE

NOM. PIPE SIZE	O.D.	I.D.	STD S.P. P.S.I.	WT. PER FT.	NORMAL SHPG. LENGTHS
1/2"	0.840	0.622	540	0.10	400 ft. coils
3/4"	1.030	0.824	350	0.14	400 ft. coils
1"	1.310	1.070	200	0.18	300 ft. coils
1 1/4"	1.660	1.380	200	0.27	300 ft. coils
1 1/2"	1.900	1.610	200	0.32	250 ft. coils
2"	2.378	2.070	170	0.44	200 ft. coils
3"	3.504	3.070	165	0.91	100 ft. coils
4"	4.504	4.030	150	1.25	25 ft. str.
6"	6.630	6.070	115	2.23	25 ft. str.

Identification Stripe: YELLOW—Standard Pipe
RED—Heavy-duty Pipe



Write For Catalog

CARTER PRODUCTS CORPORATION

10224 MEECH AVE.

CLEVELAND 5, OHIO

hoppers, spouts, over inspection tables and moving belt lines, and in operating or original equipment.—Erie Mfg. Co., Erie, Pa.

Equipment-Handling Trailers (65)

Three new tandem-axle semi-trailers with tilting platforms, in 13, 16 and 20-ton capacities, are said to be easily loaded and unloaded in a few minutes by one man, without use of skids or blocks, to save considerable time and labor in moving shovels and other self-powered equipment. All that is necessary, according to the manufacturer, is for the man to unlock the safety catch to tilt platform, drive equipment onto the platform, which automatically returns to level position, lock the catch and secure the load. For unloading, procedure is simply reversed.—La Crosse Trailer Corp., La Crosse, Wis.



Locomotive-Brake Adjustor (66)

New Mesco hydraulic brake adjuster for mine locomotives is said to adjust brakes instantly without the use of threaded parts, a feature that eliminates the possibility of threads rusting, wearing, or stripping and thereby releasing the braking power suddenly. Adjustments can be quickly made by the motorman, anywhere at any time, with a grease gun using any quality grease. Reportedly easy to install and adaptable to most mine locomotives the unit is available in any length from 10-in rod centers up and can be furnished with tubular grease extension for closed-type frames.—Mosebach Electric & Supply Co., Pittsburgh 3.

Sheet Siding Needs No Paint (67)

Production of Ruberoid Stonewall asbestos cement board, a fireproof water-resistant siding for both exterior and interior use, has recently been resumed. According to the manufacturer, Stonewall Board needs no painting, is easily and quickly installed with ordinary tools and can be installed over old weatherbeaten walls if desired. It also resists dampness, cold and freezing, rot or rust, insects and rodents, it is said, and can be used for practically any type of structure. Two folders available illustrate typical applications and methods of installation.—Ruberoid Co., New York 18.

*It's easy
to use*

O-B ROOF SUPPORT EXPANSION SHELLS AND PLUGS



CONVENIENCE

Proper pre-expansion is established at the factory when the shell is driven onto the plug. This also assembles the shell and plug into an easy-to-handle unit to be turned onto the bolt later at the mine.



SPEED

See how you can do a good job—swiftly! With a few turns of the wrist and a sharp rap on the bottom, the plug is on the bolt and the shell rests on its support (Palnut, upset ear, etc.) ready to go up into the hole. (Rapping the bolt head on the floor separates the shell from the plug. Then the shell prongs are free to spring in to conform with the hole diameter.)

● O-B Roof Support Expansion Shells and Plugs provide an easy way for rapid and secure roof bolting, because they're especially designed for the job. If you are bolting to keep your roof in tip-top shape, you'll want to know how O-B Roof Support Expansion Shells and Plugs measure up for convenience, speed and dependability.

DEPENDABILITY

Of course you want good roof! If you are using bolting to get it, remember this about O-B Expansion Shells and Plugs:

Properly installed in right-size holes, O-B Expansion Shells and Plugs will develop the full tensile strength of the bolt.

• • •

You can get more information on roof bolting. O-B field tests and observations, as well as clear illustrations of bolting procedure, are printed in our Bulletin No. 864-M. Use the coupon to get your copy.

4054-M(1)

OHIO BRASS COMPANY
Mansfield, Ohio
Please send me a copy of Bulletin No. 864-M.

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Ohio Brass

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OHIO, U. S. A.

CANADIAN OHIO BRASS CO. LTD. NIAGARA FALLS, ONT.

ESSENTIAL PROTECTION

for every mining job

EDISON

MODEL

R-4

ELECTRIC
CAP LAMP

U. S. BUREAU OF MINES APPROVED

M·S·A COMFO CAP



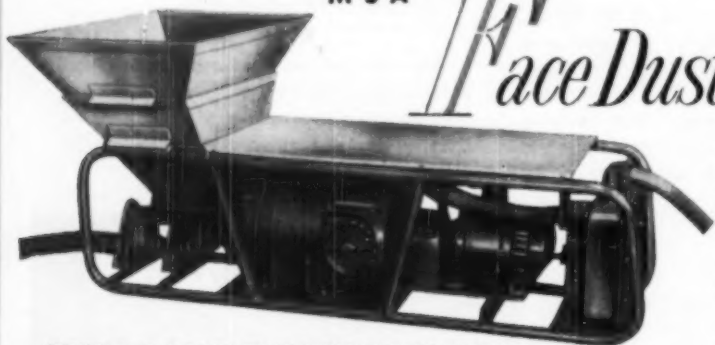
The increase in protection and production afforded by better light of Edison quality, paired with the proved head safety of the M. S. A. Comfo Cap, offer today's miners the maximum advantages obtainable in personal safeguards. The extremely high light output of the Edison Lamp is completely dependable under

all working conditions, and the lamp and battery are well-balanced and easy to wear. The M. S. A. Comfo Cap, with its low crown, light weight, and high resistance to blows and bumps, is the outstanding favorite with workers underground. Let us arrange an actual demonstration of these products—write!

M·S·A

FaceDuster

ROCK
DUST
DISTRIBUTOR



OTHER M·S·A ROCK DUST DISTRIBUTORS INCLUDE:

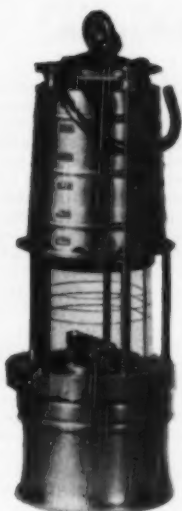
Type S High Pressure Machines in standard and 25" height . . . M. S. A. Bantam High Pressure Distributors . . . Semi-portable and Portable Types.

This genuinely portable, high pressure machine features high discharge with minimum weight. It can be mounted permanently on drill trucks, or can be transported to rooms and breakthroughs on the mine conveyor.

The M. S. A. FaceDuster employs a minimum volume of air, providing application of the maximum amount of dust to ribs and roof. Ask for detailed Bulletin AN-1.

by

MSA
SAFETY EQUIPMENT HEADQUARTERS
MSA



M·S·A WOLF
Junior
MODEL

**FLAME
SAFETY LAMP**

Compact in size and light in weight, the Junior Model of the famous M. S. A. Wolf Flame Safety Lamp does a full-size performance job. Burns longer, burns cooler, with steadier flame—easier reading than ever before. Details in Bulletin BJ-4.



M·S·A
Dustfoe
**DUST
RESPIRATOR**

Compact, lightweight, comfortable—U. S. Bureau of Mines-approved for protection against all harmful dusts. Aluminum facepiece, transparent plastic filter container. Low cost, quickly replaceable dust filters. Write for Bulletin CM-7.



M·S·A
Comfo
**DUST
RESPIRATOR**

Sturdy twin-filter type, with flexible molded rubber facepiece. Provides All-Dusts protection with notable wearing ease. Inexpensive filters are simple to replace as needed. U. S. Bureau of Mines-approved. Bulletin CR-18.

M·S·A *MinePhone*
COMMUNICATION SYSTEM

Provides instant voice communication . . . dispatcher to motorman, motorman to dispatcher, motorman to motorman . . . clear and free from noise or interference!

A dependable communication system for the mine—as modern as tomorrow! Employing frequency modulation, the M. S. A. Mine-Phone Communication System permits clear, static-free voice contact with each individual motorman while trips are in motion. Continuous reporting of track and other underground conditions is gained—production speeded—underground safety increased. The system is simple to install and easy to use. Write for a practical demonstration, and ask for Bulletin AU-2.



MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS PITTSBURGH 5, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.
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For Heavy Duty

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Dependable Products Since 1870
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Comfort • Size • Safety

For workers on heavy duty jobs; in hot or dusty work; exposed to chemical splash—any hazardous job—you can get what you need from WILLSON. Not only that, but every type has comfort features that help get safety equipment worn; and all have reliable WILLSON Super-Tough® lenses. For help in selecting exactly the right equipment for your needs, ask our nearest distributor for our new catalog—or write direct to WILLSON PRODUCTS, INC., 239 Washington St., Reading, Pa.



Headlight Offers More Light (68)

New Schroeder 32-v sealed-beam headlight designed for heavy mine duty offers 150,000 beam candlepower and improved light distribution, with more light on roof, rib and bottom and no nearby glare. Features cited by the manufacturer include cast-steel housing, steel-clad resistors, "ever-bright" reflectors, recessed bulb, short heavy filament and elimination of adjustments. Folder available includes prices.—Schroeder Bros., Pittsburgh 1.

Alloy Steel for Mining (69)

Ryerson Ry-Ax steel is said to be a moderate-cost unusually tough heat-treated carbon-manganese steel, especially developed for use in shafts and axles, etc., of mine cars, locomotives and mining equipment. Among the features cited by the manufacturer are high fatigue resistance, good machinability and high tensile strength. Bulletin available.—Joseph T. Ryerson & Son, Inc., Chicago 80.

Equipment Shorts

(70) **LAYOUT PENTAPRISM**—Ground and drill-hole layouts, earth mensuration, foundation layouts and like applications involving angles of 90 deg and multiples thereof can now be instantly checked with the Wasatch constant-deviation Pentaprism that gives erect and positive foresight images, at 90 or 270 deg, after the backsight is aligned by pistol-like aiming of the instrument, which is 4½ in long and weighs 2½ oz. Bulletin available. — Stratez Instrument Co., 1861 Hillhurst Ave., Los Angeles 27, Calif.

(71) **COAL PULVERIZERS** using Carboloy cemented carbides are now a part of stoker installations produced by Riley Stoker Co., Worcester, Mass. First installations of forged steel pegs or blade faced with Carboloy are said to have already passed the 22,000-ton mark with no appreciable wear. They are produced in dif-

HOW HYDROSEAL PUMPS

CUT DOWN COSTS IN COAL PRODUCTION



Hydroseals mean larger coal profits, because their initial high efficiency is maintained throughout the life of the pump, thanks to Hydrosealing and abrasion-resistant ASH-21 Alloy Pumping Parts. Power and service costs are thus reduced to a minimum.

Thousands of Hydroseals—in all parts of the world—are proving that they offer the best solution to these coal-mine jobs:

- ① Circulation of sand, sludge, or lump-coal in hydraulic cleaning operations.
- ② Pumping tippie or breaker refuse to storage piles or fills.
- ③ Moving coal to distant locations for storage or from mine to preparation plant.
- ④ Reclaiming culm banks.
- ⑤ Pumping overburden in hydraulic stripping operations.
- ⑥ Cleaning muck from reservoirs and sumps.

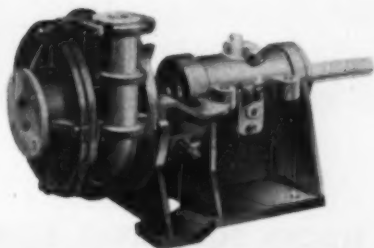
Here are two of the six Hydroseals in the cleaning plant of a major coal producer. Four pumps (two standbys) handle $\frac{1}{4}$ -O-inch coal sludge at about 40% concentration; two others pump middlings that have been crushed to $\frac{1}{4}$ -inch top size. Service-proven in 20 months of two-shift operation.



Our engineers will be glad to tell you how you can add to your coal profits with Hydroseals. Write to . . .

THE ALLEN-SHERMAN-HOFF CO.
231 South 15th Street • Philadelphia 2, Pa.

Offices and Representatives in
Every Coal Mining District in the United States



HYDROSEAL

SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD.

Under this Coal is a SECO VIBRATING SCREEN



SECO
TRUE CIRCULAR ACTION
VIBRATING SCREENS

THIS BABY CAN
AND IS TAKING IT!

For over 4 years this single-deck Seco scalping screen has been faithfully removing the lump from R. O. M. in a Kentucky coal mine.

Today it operates with the same smoothness and efficiency as when first installed and will continue to deliver this kind of performance for many more years.

Why not check Seco for your coal screening requirements.

SEND FOR BULLETIN

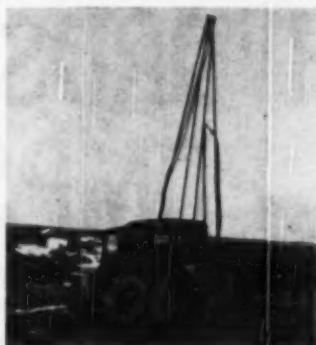
#11, Dept. CA-7



SCREEN EQUIPMENT COMPANY, INC.
BUFFALO 21, NEW YORK

In Canada: United States Steel Corp. Ltd., Toronto, Ont.

ferent sizes.—Carboly Co., Inc., Detroit 32, Mich.



(72) **JEEP MOUNTING**—Now is available for the new Acker "Teredo" core drill, designed to fill the need for a lightweight, compact, portable, high-speed core drill of medium capacity for depths to 600 ft (*Coal Age*, April, p. 108). Bulletin 30 available. —Acker Drill Co., Inc., Scranton 3, Pa.



(73) **NEW METAL SAFETY GOGGLE** especially effective for miners, trackmen, timbermen and other mine workers, features lightweight and stronger construction to provide superior eye protection from flying particles. The new F4100 Ful-Vue metal goggle is said to have many outstanding features not ordinarily found in metal safety goggles and is particularly designed for wearer comfort and long wear. It is available in various sizes and in several lenses, including prescription-ground lenses. —American Optical Co., Southbridge, Mass.

(74) **NEW PROTECTIVE PLASTIC SHUNT** for Western electric blasting caps is a sleeve made of non-conductive plastic, which is slipped over the bare ends of the leg wire and by covering them, minimizes possible corrosion from atmospheric conditions, and making it unnecessary to scrape the wire preparatory to wiring up a shot.

WANT Bulletins or More Data on Products Described Here? Just Circle the Numbers on the Card Facing p 148 and Mail!

HERE'S WHAT ALLIS-CHALMERS MOTOR "Certified" SERVICE MEANS TO YOU

W. L. Manly, Mgr.
District Sales Dept.
ALLIS-CHALMERS



THE WORD SERVICE has more meanings than there are definitions in a dime store dictionary. It is often used insincerely as a catchword lure . . . a pretense as shallow as frost on a window. To others, service is a natural and obligatory complement of selling . . . helping customers select what best fits their needs, filling the order accurately and promptly, and insuring that performance fulfills the promise.

"The meaning of Allis-Chalmers Certified Service is clear and unequivocal. It backs up product performance and assures the buyer that dependable Certified Service is conveniently close.

"It is unique, efficient and sound. Unique, because it allies Allis-Chalmers with independently owned and operated shops. Efficient, because it minimizes delay and eliminates heavy transportation expenses. Sound, because the work is performed by reli-

able and experienced concerns.

"This policy is practiced by all of the 82 A-C Certified Service Shops in every major U. S. industrial area."

NEW MOTORS AND CONTROLS, TOO
Remember — your nearest A-C Authorized Dealer or Certified Service Shop also offers a complete line of new motors and controls to 200 hp.

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Birmingham—Elec. Reps. & Serv. Co.
Montgomery—Standard Electric Co.

ARIZONA
Phoenix—Copper Electric Co., Inc.

CALIFORNIA
San Diego—Calt. Elec. Works
Los Angeles—Larson-Hogue Elec. Wks.
Oakland—T. L. Rosenberg Company
San Francisco—Whitcomb-Goodman
San Jose—Hammill Elec. Works

COLORADO
Denver—Rahr Electric Company

CONNECTICUT
Hartford—Charles H. Lippert
Waterbury—Elec. Motor Repair Co.

FLORIDA
Jacksonville—Turner Elec. Works
Miami—Pennimichler Armature Wks.
Tampa—Dempie Armature Works

GEORGIA
Atlanta—Barden Thompson Elec. Co.
Columbus—Smith-Gray Electric Co.

ILLINOIS
Chicago—Chicago Electric Company
Marion—Giles Armature & Elec. Wks.

INDIANA
Indianapolis—Schreyer Electric Co.
Evansville—Dramett Elec. & Mfg. Co.

IOWA
Sioux City—Smith Elec. & Supply Co.

KANSAS
Wichita—Tarrant Elec. Machinery Co.

LOUISIANA
New Orleans—Industrial Electric
Shreveport—Shreveport Arm. & Elec.

MAINE
Brewster—Stahler J. Lunt Company

MARYLAND
Baltimore—Krystone Elec. Co., Inc.

MASSACHUSETTS
Lawrence—Roland E. Gilman Co.
Roslindale—Hannay Electric Motors
Springfield—Elec. Motor Repair Co.

MICHIGAN
Grand Rapids—Grand Rapids Ind. Co.
Detroit—Stecher Electric Company

MINNESOTA
Duluth—Mielke Electric Works, Inc.
Minneapolis—Parsons Electric Co.

MISSISSIPPI
Vicksburg—Luthie Electric Company

MISSOURI
Kansas City—Boyle-Hillburn Elec. Co.
St. Louis—French-Gorkman Elec. Co.

NEBRASKA
Omaha—Omaha Electrical Works

NEW HAMPSHIRE
Concord—A. S. Tracy

NEW JERSEY
Atlantic City—Charles A. Buckley
Paterson—Elec. Service Reps. Co.
Yonkers—Lockwood Elec. Motor Serv.

NEW MEXICO
Albuquerque—Popoff Electric Co.

NEW YORK
Buffalo—Robertson Electric Co., Inc.
Jamestown—A. R. Westburg
New York—Consolidated Elec. Motor
Rochester—Vanderlinde Elec. Corp.
Utica—Mather Evans & Diehl Co.
Watertown—Watertown Electric, Inc.

NORTH CAROLINA
Charlotte—Southern Elec. Serv. Co.
Rocky Mount—Hammond Electric Co.

OHIO
Cincinnati—Cincinnati Elec. Supply
Cincinnati—Electric Service Co.

THERE ARE 82
ALLIS-CHALMERS
Certified Service Shops
THROUGHOUT THE U.S.A.

Oregon Falls—A-C Supply Company
Toledo—Kosmoff Electric Company
Vancouver—Winkle Electric Company

OKLAHOMA
Oklahoma City—Southwest Elec. Co.
Tulsa—Smith-Milligan Electric Co.

OREGON
Eugene—Kalen Elec. & Mach. Co.
Klamath Falls—Ray Roper Elec.
Portland—Milwaukee Machinery Co.

PENNSYLVANIA
Johnstown—Universal Elec. Mfg. Co.
Scranton—Mid-State Elec. Equip.
Philadelphia—Elec. App. Supply Co.
Pittsburgh—Penn. Elec. Coll. Corp.
York—Industrial Electric Company

RHODE ISLAND
Woonsocket—Dunlap & Buckley, Inc.
SOUTH DAKOTA
Sioux Falls—Elec. Motor Repair

TENNESSEE
LaFollette—Standard Armature Wks.
Memphis—Ind. Elec. & Supply Co.

TEXAS
Amarillo—G. E. Jones Electric Co.
Dallas—Industrial Elec. Equip. Co.
El Paso—H. & M. Machinery Company
Fort Worth—Central Electric Company
Houston—Ray A. Service Company

VIRGINIA
Richmond—Winfield & Handley
Roanoke—Virginia Armature Company

WASHINGTON
Spokane—Lee P. Austin Company

WEST VIRGINIA
Charleston—Charleston Elec. Supply

WISCONSIN
Green Bay—Dramett Electric Co.
Sheboygan—Chas. Electric Company
Wausau—Electric Motor Service
Wis. Electric Supply Co.



ITS 4 FEATURES ASSURE CONTINUAL LOW-COST MOVEMENT OF MATERIAL

- 1 **EASILY DISMANTLED**—Impeller and shaft sleeve can be renewed *without disturbing the suction and discharge piping or the bearings*. Simply loosen 4 bolts . . . slip them out of disc slots . . . and pull off end cover. Four adjusting screws easily close worn clearances on suction side of impeller.
- 2 **GLAND UNDER SUCTION PRESSURE ONLY**—Since it is not subject to high stuffing box pressures, it is much less vulnerable to abrasive solids. Packing troubles are reduced to an absolute minimum . . . and there is considerably less dilution of your mixtures due to leakage.
- 3 **CORROSION-ABRASION RESISTANT**—The Morris Type R has no internal studs and bolts . . . no troublesome internal fits and joints. For ore processing, the alloy parts of the Type R stand up under the severe wear of corrosive and abrasive materials. These parts are easily renewed with minimum labor and time.
- 4 **SHELL IS INTERCHANGEABLE**—Suction and discharge nozzles can be swiveled around the axis of the pump to any of 72 different locations. Changed for either right or left hand rotation.

MORRIS TYPE "R" SLURRY PUMPS

For low-cost operation . . . low-cost maintenance . . .
longer hours of continuous service

IN MINING OPERATIONS, it handles all types of mixtures containing abrasive solids . . . ore concentrates . . . tailings, etc., etc., . . . caustic or acid slurries.

MORRIS MACHINE WORKS

Baldwinsville, N. Y.
Branch Offices in Principal Cities

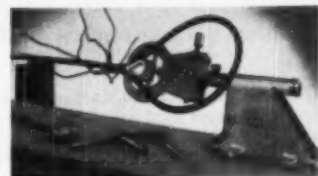
MORRIS

Centrifugal Pumps

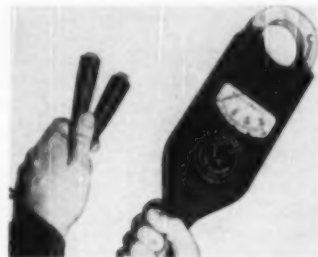
the company says.—*Explosives Div., Olin Industries, East Alton, Ill.*



(75) **PORTABLE ELECTRIC HAND SAW**, the 6-in Maxaw weighing only 10 lb, is designed for one-hand operation and will operate effectively in any position, the manufacturer says. The 6 $\frac{1}{2}$ -in blade will cut a full 2-in depth on square cuts and 2-in dressed lumber at a 45-deg angle and has a lockable trigger-type switch. Bulletin 512-A available.—*Fred W. Wap-pat, Inc., Mayville, N. Y.*



(76) **WIRE-ROPE SPLICING MACHINE**, the Jacoel No. 9, will handle $\frac{3}{8}$ - to 1 $\frac{1}{4}$ -in wire rope, weighs only 75 lb and requires only two workers, with a resultant saving in space and reduction in labor up to 50%, it is said. The No. 1 unit splices 1/16- to 7/16-in wire rope, and larger units are available on order.—*Quay Industries, Washington 6, D. C.*



(77) **HOOK-ON WATTMETER**, applicable to active and reactive power measurements in single and poly-phase circuits, permits taking measurements without interrupting service. The Type AK-2 instrument is designed to meet exacting requirements in accuracy, weight and simplicity of operation, and the single dial switch permits selection of any one of six power measurement ranges to provide reading from 3 to 300-kw full-scale deflection.—*General Electric Co., Schenectady 5, N. Y.*

(78) **DIESEL FUEL PUMP**—A new



POWER ON TRACKS

Big "Champions of Crawlers," mighty International TD-24's strip overburden for Snyder Bros.

"We Use All INTERNATIONAL POWER"

—says C. H. Snyder of Snyder Bros., Inc., Cowansville, Pa., strip miners. The reasons why are clear.

For example, the two International TD-24's working for Snyder Bros., do as much work as a four-yard dragline when it comes to removing overburden. The two big "Champions" are also available when needed to build roads over the steep Pennsylvania mountainsides and do other construction work.

An International UD-24 Diesel Power Unit teamed up with a matched generator set produces all the electric power needed for the mine. This

is the same powerful engine that drives the big "Champion of Crawlers" and is as dependable as daybreak.

To complete the power picture, an International "A" wheel tractor sweeps the coal to remove dirt before shoveling it into trucks.

"We preach International constantly," says Mr. Snyder. That is the mark of a satisfied owner. Why not visit your International Industrial Power Distributor now and find out the facts? You, too, will find it pays to use International Power.

INTERNATIONAL HARVESTER COMPANY • Chicago



POWER ON WHEELS

A fast, compact International "A" and mounted broom sweep the coal before it is shoveled into trucks.



POWER ON THE JOB

A big UD-24 International Diesel spins a matched generator to produce electric power for Snyder Bros.



INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



"Good Service on special sizes" . . . that's only one of the things we mean by **Service Plus!**

U-S-S HIGH STRENGTH STEELS
The steels that do more

**COR-TEN • MAN-TEN • ABRASION-RESISTING
MANGANESE-NICKEL-COPPER
HOT ROLLED AND COLD
FINISHED BARS • PLATES • FLOOR PLATE
STRUCTURALS • SHEETS • STRIP • STAINLESS
ALLOY STEELS • ALUMINUM • TOOLS
SUPPLIES • MACHINERY**

● In a recent survey, one customer gave "Good service on special sizes" as his reason for ordering his steel from United States Steel Supply Company. And his words summed up the statements of many of our customers. Whenever your problems involve steel in special sizes, forms or specifications, call United States Steel Supply Company. We'll do our best to live up to our customers' high opinion of our service.

Service Plus includes many things besides "Good service on special sizes," however. It features prompt delivery, large capacity and an unrivaled reputation for service. *Service Plus* specializes in courteous attention to your every requirement—it's our way of saying we'll do all that is humanly possible to supply you with the steel you want . . . where you want it . . . when you want it.

WHEN YOU DEAL
WITH US, YOU GET
**Service
Plus!**

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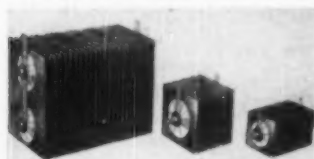
UNITED STATES STEEL

refinement in the exclusive Cummins fuel system is a new fuel pump, said to be 65% lighter in weight, 56% smaller in size, and designed for longer life operation and for easier servicing. The DD (double disk) pump now is offered as standard equipment on the 300-hp Model NHRS-600 and 275-hp Model NHS-600 Cummins diesels, and also is available as optional equipment on other Cummins models. A tandem arrangement of the new DD pump is standard on the 12-cylinder 400-hp Model NVH-1200 and 550-hp Model NVHS-1200 units. —Cummins Engine Co., Columbus, Ind.

(79) DUST CONTROL—New engineering service offered by Johnson-March reportedly is based on the scientific application of liquid diffusion compounds for the control of dust in mines and other industries. The company's new engineering division is prepared to design and supervise installation of liquid-diffusion systems to meet the needs of any-size operation. —Johnson-March Corp., 1724 Chestnut St., Philadelphia.

(80) PROTECTIVE COATING known as "Polyclad" is a corrosion-resisting polyvinyl-chloride coating that is said to be waterproof, weatherproof and inert to most corrosive atmospheres, dilute acid and alkali solutions, gasoline and oil. Data Sheet C-11 offers detailed information on properties and applications. —Carboline Co., St. Louis 5, Mo.

(81) PAYROLL TAX-DEDUCTION SYSTEM that combines Social Security and Withholding taxes in one calculation and recording, as recently approved by the Government, permits considerable savings in clerical work through use of the Delbridge Combined Social Security and Withholding Tax Chart covering a wide range of deductions. —Delbridge Calculating Systems, Inc., St. Louis 17.



(82) DRY SELENIUM RECTIFIERS of heavy duty quality in exceptionally large plate sizes, produced by a new vacuum process, offer ability to withstand high inverse voltage and have particularly low resistance in the conducting direction, the company says. Standard size plates run from 1x1 in. to 6x12 in. Special large plates are made to order up to 12x52 in., with two or more studs used in stacking the larger plates to provide stiffness and mechanical strength. Bulletin available. —Syntron Co., 975 Lexington Ave., Homer City, Pa.

"I can't afford to take a chance on X-SHOCK!"



Herb Fisher, rigging foreman for Morrison-Knudsen Co., Inc. and Peter Kiewit Sons Co., at Grand Coulee Dam, knows plenty about what sudden shock loads can do to wire rope fastenings. He knows that "x-shock"—the unforeseen blow that engineering can't calculate—can snap cheap clips like so many clothes-pins. "I stick to genuine CROSBY Clips," says Herb. "That drop-forged strength is mighty good insurance!"

That's why industry uses more

CROSBY CLIPS

than all other drop-forged wire rope fasteners!



This is the AMERICAN HEAVY DUTY UTILITY SNATCH Block... other AMERICAN wire rope blocks from 1½ to 250 lbs. capacities.



There is only one genuine CROSBY Clip—identified by the famous red U-bolt. Drop forged from finest steel. Hot dip galvanized—a thin, tough, chip-proof zinc coat. Machine cut threads, chamfered bolt ends. Sizes for ½" to 3" wire rope—at distributors everywhere.

MAIL THIS COUPON FOR FREE BOOK

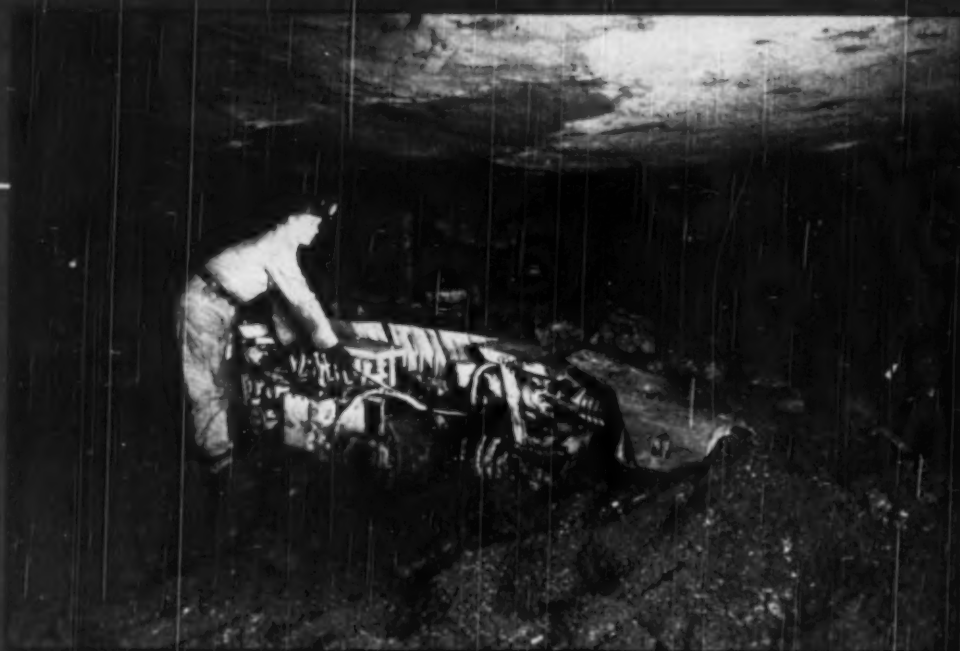
American Hoist & Derrick Company
St. Paul 1, Minnesota

● Please send free book showing proper methods of applying CROSBY Clips.

NAME _____
COMPANY _____
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CITY _____ ZONE _____ STATE _____

THEY'VE GOT WHAT IT TAKES

For High Unit Production...



THE GOODMAN TYPE 660 TRACTOR TREAD LOADER

• **CAPACITY**—rated at 5 to 10 tons per minute in free loading coal.

• **WINDING LOADING HEAD**—cleans up an 18 foot path with only forward and backward maneuvering.

• **PUSHING REAR CONVEYOR**—range 40 degrees to either side, is adjustable in height.

• **HYDRAULIC CONTROL**—any movement of loader can be secured singly or simultaneously, with any other movement.

• **LOW HEIGHT**—22 inches over-all, 27 inches at coal line.

• **LOW MAINTENANCE**—the best of materials, plus expert workmanship, are your guarantee of low upkeep expense.

GOODMAN
MANUFACTURING
COMPANY

HALSTED STREET AT 48TH

IN TRACKLESS MINING



THE GOODMAN TYPE 570 SHUTTLE CAR

• overall height 42" capacity 310 cu. ft., water level full

• adjustable height discharge conveyor, hydraulically controlled

• four wheel drive, two torque motors

• four wheel steering, mechanized with hydraulic amplifier

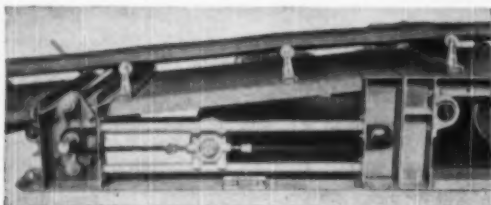
• hydraulically driven cable reel

CHICAGO 9, ILLINOIS



Goodman Type 570 Shuttle Car, Chicago 9, Ill.

WHATEVER YOU NEED GET IT "OFF-THE-SHELF"



TAIL SECTION

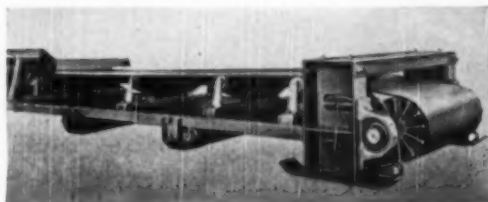


Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings and belt. Strong enough so you can rest a feeder on it.



INTERNAL TAKEUP

Located directly back of the drive. Handles 10' of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents back'ng-up. Worked from either side of conveyor.



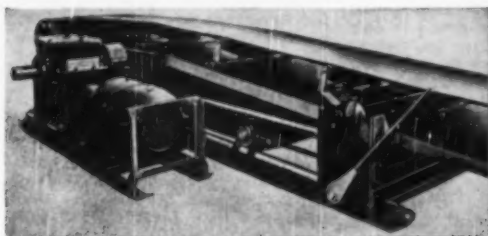
IN A MINE CONVEYOR— AT HEWITT-ROBINS!

**Shipped Complete—Right Out of Stock—
from Passaic, N. J., and Charleston, W. Va.**

Every mine is different—every mine has different underground conveying problems. That's why Hewitt-Robins makes not one but *three* different types of mine conveyors. That means mine operators can match Hewitt-Robins equipment against their own *specific requirements* and get exactly what they need, right out of Hewitt-Robins warehouses in Passaic and Charleston. Not just the conveyor machinery itself, but belt, motors, reducers and drives!

Hewitt-Robins *Types I and IS Mine Conveyors* have *internal* drive for level, uphill or downhill operation; in 26", 30", 36" widths, lengths up to 3000 feet or more if needed. *Type H* has head drive for level or uphill operation; in 26" and 30" widths, lengths up to 2000 feet.

Intermediate Sections are standard, fit all types, simple to assemble because both ends are identical and need no "matching up." Available in 8' and 10' lengths. Also available are standard 12' Intermediate Sections—channel construction, bolted connections—for permanent 30", 36" and 42" wide main haulage installations, using the standard terminals.

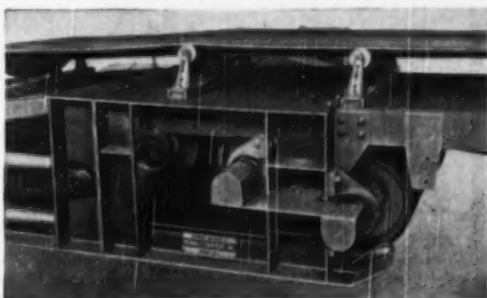


UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.

You can choose single or tandem pulley drive, internal or tail take-up, the length and belt width that fits your particular mine . . . but in every case you get famed Ajax® heavy-duty belting, Hewitt-Robins ball-bearing, one-shot lubrication idlers, lagged pulleys for maximum power transmission . . . over half a century of engineering and manufacturing know-how!

Remember—*only Hewitt-Robins* makes both machinery and belt; *only Hewitt-Robins* is willing and able to take unified responsibility for successful installation and operation! For complete specifications—or out-of-stock delivery—write Hewitt-Robins Incorporated, 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



SINGLE OR TANDEM DRIVE

Hewitt-Robins Mine Conveyors come equipped with *both* single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

HEWITT-ROBINS
MINE CONVEYORS

HEWITT-ROBINS  INCORPORATED

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK® ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

Where **WOOD** is indicated and **PERMANENCE** demanded

Specify

treatment with **DU PONT** **COPPERIZED CZC**

You'll think of wood as a different structural material after it's pressure-treated with Du Pont Copperized CZC. And here's why. Copperized CZC gives long-lasting protection against termites, fire and decay without changing the inherent structural characteristics of wood.

This salt-type wood preservative makes lumber and timber unpalatable to termites . . . kills decay-causing fungi . . . gives a high degree of fire retardance. Copperized CZC does all this while leaving wood clean, paintable, odorless and safe to handle. Sound reasons why you should specify pressure-treatment with Du Pont Copperized CZC.

Full technical details on Copperized CZC available for the asking. Write: E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington 98, Delaware.



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

Among the Manufacturers

Organizational changes in the mechanical-goods sales division of Goodyear Tire & Rubber Co. include the promotion of R. C. Stein, former sales representative, to manager of molded-goods sales at the St. Marys, Ohio, Goodyear plant. R. E. Chapman has been appointed manager of hose sales, Akron, succeeding R. W. Sanborn, who is now representing the mechanical-goods division in the Akron territory.

Roy M. Smith has been appointed chief engineer, and Roy H. Albright, assistant to the chief engineer, Railway & Industrial Engineering Co., Greensburg, Pa. Mr. Smith has been distribution engineer for the company since 1945, and Mr. Albright has been with R&IE since 1928.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa., has appointed E. A. Carpenter, Wisconsin and Minnesota sales representative for the last 4 yr, Chicago-district sales manager. C. E. Hughes, a representative in the Southern and Indiana territories since 1936, has been named district sales manager of the newly created southern district, with headquarters in Birmingham, Ala.

Broderick & Bascom Rope Co. has acquired the entire stock interest of the Broderick family, and John K. Broderick and Arthur L. Broderick have retired as president and vice president, respectively, and as directors. Charles E. Bascom, with the company for 48 yr, has been elected president, and Joseph H. Bascom has been elected first vice president and secretary-treasurer. Together with J. F. Hedding, of Pittsburgh, they constitute the new board of directors and will continue in active management of the company, which will celebrate its 75th anniversary next year.

Marion Power Shovel Co., Marion, Ohio, has appointed W. D. Calland district sales manager in the Far West, succeeding Edward R. Daley, with headquarters in San Francisco, and Ernest J. Riggs, as district sales manager in the Mountain states, with offices in Phoenix, Ariz. Mr. Calland formerly was Marion district sales manager in the St. Louis office, and Mr. Riggs has been active in sales and service work for the company. Rasmussen Equipment & Supply Co., Salt Lake City, has been appointed Marion distributor for the state of Utah, eastern Nevada and parts of southern Idaho and southwestern Wyoming.

Four new appointments in General Electric's Apparatus-Department Atlantic district include: F. L. Headley, as assistant manager of the Pittsburgh apparatus-sales office, who will

later replace the present office manager, Joseph Bryan, upon his retirement; N. L. Whitecotton as manager of the Philadelphia apparatus-sales office, succeeding Mr. Headley; F. I. Kittredge as manager of the Philadelphia apparatus-sales office's industrial-customer division; and W. C. Mason as Atlantic district manager of the agency and resale division, with headquarters at Philadelphia.

I-T-E Circuit Breaker Co., Philadelphia, has formed a separate small circuit breaker division to provide a more flexible and complete service to users of such equipment. Frederick G. Schmidt, assistant to the president, has been appointed manager and will direct sales, engineering, manufacturing and associated activities. William Deans, chief engineer for I-T-E since 1933, has been elected vice president in charge of engineering and will be responsible for origination and coordination of the company's engineering activities. Gus E. Heberlein, formerly chief engineer of I-T-E's subsidiary, Railway & Industrial Engineering Co., Greensburg, Pa., has been appointed manager of the switchgear division of the parent company, in charge of large air circuit breakers and switchgear.

Fairbanks, Morse & Co., Chicago, has purchased 40 acres of land in the greater Kansas City, Mo., area from the Atchison, Topeka & Santa Fe and is planning construction in the near future of a \$5,000,000 scale plant. "When completed," Robert H. Morse Jr., company president, said, "the new plant will add materially to the production of scales and it will be one of the finest precision-manufacturing plants of its kind in the world."

Floyd J. Mischke has been named export manager, Tractor Div., Allis-Chalmers Mfg. Co., succeeding M. J. Proud, who died April 16 in San Jose, Costa Rica. Mr. Mischke has been with the Tractor Div. since 1930 and was appointed assistant export manager in May, 1948.

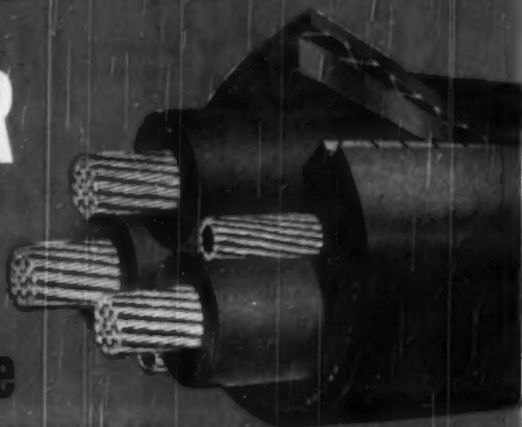
Enlarging its line to supply equipment for trucks of 1 ton or under, Gar Wood Industries, Inc., Wayne, Mich., has purchased the National Truck Equipment Co., Waukesha, Wis., and will operate it as a newly formed and wholly owned subsidiary, to be known as the National Lift Co. With the purchase, the established lines of Gar Wood and St. Paul dump bodies, hoists and refuse-collection bodies, and Gar Wood winches, cranes and pole derricks, will be augmented by products of the National Lift Co., including the Dump-O-Matic twin-hydraulic hoist for ½-, ¾- and 1-ton trucks, the Hydra-Clutch pump, a fan-

Anaconda introduces

COLD RUBBER

in SECURITYFLEX

600-Volt Mine Cable



NEW INSULATING
MATERIAL LENGTHENS
CABLE LIFE, CUTS
SERVICE FAILURES

FIRMER AND TOUGHER, cold rubber makes Securityflex® Type G 600-Volt Mine Cable still more resistant to injury by moisture, crushing and cutting. Exhaustive tests show definitely that this improvement lengthens cable life, reduces power interruptions and lessens cable maintenance, trouble and expense.

RUBBER-CORED GROUND—Securityflex Type G 600-Volt Mine Cable also provides the famous patented rubber-cored ground wire construction. The rubber core provides larger ground wire diameter, and reduces tendency of the

grounding wires to cut the cable conductor insulation.

FIRM SUPPORT GIVES PROTECTION—An additional advantage of rubber coring is the cushioning support it gives every wire in each ground wire strand against displacement and damage when the cable becomes twisted.

Examine this cable. Check its construction, see its advantages. Just call your nearest Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

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Reg. U. S. Pat. Off.

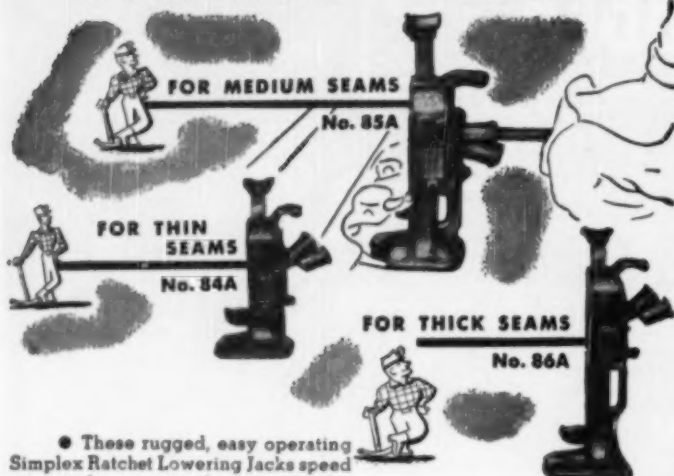
The right cable for the job **ANACONDA®**
WIRE AND CABLE

**SAFETY
SPEED
STAMINA**

for ALL Mine Jacking

with
**RATCHET
LOWERING**

SIMPLEX JACKS



• These rugged, easy operating Simplex Ratchet Lowering Jacks speed mine jacking . . . and insure greater safety. Proved and used in every type of mine, Simplex Jacks can be depended upon to step up efficiency; to cut time and costs on lifting, lowering, leveling and other jacking jobs.

Every Simplex Ratchet Lowering Jack is built to lift full rated capacity on cap or toe. Each guarantees maximum service with these features:

Double lever sockets—Extra strong, adjustable spring mechanism—Shorter Fulcrum centers—Large Trunion bearings—Reinforced, inner-ribbed housings.

No. 86A—FOR THICK SEAMS

5 Tons capacity—20" high—12" lift. For coal cutting and loading machines, rearing mine cars and light locomotives, shop, track work, etc.

No. 85A—FOR MEDIUM SEAMS

3 Tons capacity—17" high—10" lift. For locations where more limited height and lift are required. Combines maximum strength with minimum weight.

No. 84A—FOR THIN SEAMS

5 Tons capacity—Weights only 20 lbs.—14" high—7" lift. For easy handling and operation in cramped quarters.

THE COMPLETE SIMPLEX LINE OF MINE JACKS

also includes—Mine Timber Jacks, Post Pullers, Hydraulic Jacks, Geared Jacks, and Anchor Jacks. Send for Bulletin: Mines 47 and Mines 48

Safer Roof Control with SIMPLEX MINE ROOF JACKS

Three Types of Heads



**SIMPLEX
PIN-UP JACKS**
Type "FL" Head—
Ret with lugs.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

TEMPLETON, KENLY & COMPANY

1048 South Central Avenue • Chicago 44 Illinois

belt-driven hydraulic pump with self-contained clutch, and the Jumbo twin-hydraulic hoist for 1½- and 2-ton trucks.

Joseph T. Ryerson & Son, Inc., Chicago, has announced several changes in executive personnel: Harold B. Ressler, vice president and general manager of sales since 1932, has been elected first vice president. C. L. Hardy, former assistant vice president has been named assistant to the president. Thomas Z. Hayward, assistant general manager of sales since 1944, has been appointed general manager of sales for the group of 13 Ryerson steel-service plants. Roland W. Burt, head of the tubular products division, has been made sales manager of the company's Chicago plant.

Stephen M. Wilson Jr., special representative in New York, has been appointed manager of the Joplin (Mo.) district explosives-sales office of the Atlas Powder Co., succeeding D. J. C. Copps, who has been transferred to the company's general offices in Wilmington as special assistant to R. K. Gottahall, assistant general manager. Paul D. Mayfield, associated with the Joplin office since 1931, has been named assistant manager.

C. A. Hubemann has been appointed manager, industrial brake sales department, aviation products division, Goodyear Tire & Rubber Co., a new department established to handle increasing demand for its industrial disk brake, adapted in 1948 from the company's airplane-type single-disk unit. The brake has been successfully applied to shuttle-car operation, among other uses, with a marked reduction in maintenance and down time, the company reports.

Trumbull Electric Mfg. Co., Plainville, Conn., has announced three new appointments in its newly reorganized marketing department. Charles Bangert Jr., designing engineer, has been named product-planning manager. Yale T. Chaney, formerly distribution-systems sales manager, has been made sales-engineering manager for the Eastern region. Robert C. Wilson, manager of sales for the Norwood (Ohio) works, has been named sales-engineering manager for the Central region.

Blackhawk Mfg. Co., Milwaukee, has appointed Gene LaPorte territory representative for Chicago. Mr. LaPorte, who previously was with Sterling Products Co. of Chicago, succeeds Bill Manning.

Manford R. Lillengreen has been named sales manager, Baer Steel Products, Inc., Auburn and Renton, Wash. Mr. Lillengreen formerly was with the H & L Tooth Co. as manager of its Portland, Ore., branch and later in dealer organization work throughout the nation.

Gumout Div., Pennsylvania Refining



NEW! Light in weight! Speeds Construction!

COSTS LESS TO PUT UP . . . practically nothing to maintain

Here's a new all-metal building sheet that can help you set new construction records. Alcoa Aluminum Building Sheet weighs only 56 pounds per square. Workmen can erect more per day using only standard tools and methods.

Where painting is difficult and costly, aluminum roofing and siding save money—immediately on first costs and continuously on maintenance. Think about this, then figure your next job with Alcoa Aluminum Building Sheet.

Alcoa Building Sheet is immediately available with all correct fasteners and accessories for easy assembly. For application and engineering details, call your nearby Alcoa sales office, listed under "Aluminum" in your Classified Telephone Directory. Or mail the coupon.

FACTS FOR CONTRACTORS AND ENGINEERS

Alcoa Industrial Building Sheet may be erected over steel or wood purlins or girts. It may be fastened by nails, purlin nails, straps, clips, screws or weldable studs.

Lengths: 5 to 12 feet. Widths: Roofing, 35 inches. Siding, 33½ inches.

Thickness: .032 inches—equal to 22 U. S. Gauge.

Available for prompt shipment with all types of fasteners, flat and preformed flashing.

For complete details MAIL THIS COUPON, TODAY

Aluminum Company of America
1469G Gulf Bldg., Pittsburgh 19, Pa.

Please send me engineering and application data on Alcoa Industrial Building Sheet.

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Company

Address

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ALCOA

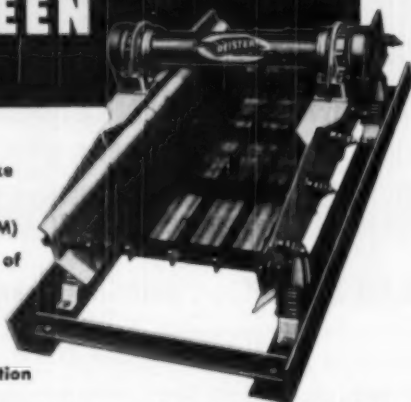
INDUSTRIAL BUILDING SHEET



INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT-MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • SOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

DEISTER Announces New Non-Blinding CARBON COAL SCREEN

- Much Longer Stroke
- Far Higher Speed
(approx. 2000 RPM)
- Graduated Length of
Stroke
- Aerodynamic
Construction
- Unitized Head-Motion



This new Deister Screen is designed especially for the faster, better handling of carbon coal and other damp, sticky, fines.

An extremely rapid stroke-cycle has been developed by removing unnecessary dead weight. Light but strong materials and aircraft construction principles are used in both head-motion and supporting members.

The new Unitized Head-Motion is precision-built and jig-assembled . . . is demountable as a unit and interchangeable so that there is never any need for downtime when screens are operated in batteries.

You'll want all the facts on this new Deister Screen for faster, more profitable handling of damp, sticky materials. Write for Bulletin No. 52 —today.



This cut-away shows the new Unitized Head-Motion of the Deister Carbon Coal Screen.



DEISTER MACHINE COMPANY
FORT WAYNE 4, INDIANA

Co., Cleveland, has appointed new sales representatives as follows: Phil S. Crutcher Jr., Louisville, Ky., for Kentucky and bordering Indiana counties; R. Howard Chamness Co., Dallas 5, Tex., Texas, Oklahoma, Arkansas and Louisiana; Dirks & Co., Portland 9, Ore., and Seattle, Wash., Washington, Oregon and Idaho; and A. H. Leu Sales Co., St. Louis 3, Mo., southern Illinois, eastern Missouri and northeastern Arkansas.

Bucyrus-Erie Co., South Milwaukee, Wis., has enlarged the territory of its representative in northern Indiana, the Indiana Equipment Co., Indianapolis and Ft. Wayne, to include 14 counties in northwestern Ohio. Indiana Equipment will be represented in the new Ohio territory by James R. Schultz, who has been active in the Ft. Wayne area.

Frank Prox Co., Inc., Terre Haute, Ind., is celebrating its 75th anniversary in business this year. Frank Prox, a coppersmith by trade, went in business for himself in 1875, lining and repairing mine pumps and doing general machine work. Later a small foundry was added and, in 1890, his oldest son, Herman C. Prox, joined the company as a salesman, becoming president on his father's death in 1921. In the early stages the company produced fans, engines of various types, cages, screens, mine cars and other mine machinery. In 1906, it began making mining-machine cutter chains, cutter heads and bars, a line for which it is well known throughout the coal industry today. Robert F. Prox, present head of the company, is a grandson of the founder, and served as vice president from 1921 until 1936, when he became president. The fourth generation in the company, Robert F. Prox, Jr., became treasurer last year. With Robert F. Prox III, born April 1, 1950, the company hopes to have a member of the Prox family active in the firm for another 75 yr. Chas. J. Forbes, present sales manager of the mining machine department, is the son of Matt Forbes, who was in charge of the department for 40 yr.

Robert W. Watson has been named to direct the Pittsburgh district sales of the Wood Preserving Div., Koppers Co., Inc. Mr. Watson formerly was in charge of sales at the Marietta, Ohio, office and has been succeeded by Larrie A. Pisegna.

Mack Trucks, Inc., New York, is planning a series of special events in various parts of the country to celebrate its golden anniversary this year. The opening ceremony in the program was held June 22 at the company's Allentown, Pa., plant. A meeting of the company's board of directors, held in Allentown for the first time, was preceded by a luncheon at the Lehigh Country Club, with city officials and civic leaders as guests. Mayor D. V. Hock of Allentown unveiled the new Model A truck, the first of the new Golden Anniversary Mack trucks.

Get your copy of J&L'S NEW

J&L STEEL

WIRE ROPE HANDBOOK

for the man on the job

Pocket size •

easy to read •

up-to-date



Here's the new illustrated J&L Wire Rope Handbook . . . written for the man who handles wire rope on the job. It contains 96 pages of information to help you get the most out of the wire rope on your machine.

It's easy to understand . . . it has the answers to many of your questions about wire rope . . . it's yours for the asking. Thousands of men have already put this book to good use. Why not send for your copy now?

It tells you about

- installation and operation
- selecting the right rope
- J&L wire rope maintenance
- standard fittings, slings, and splicing service available with J&L wire rope

Recommendations for:

Excavating Equipment
Oil Country Uses
Marine Applications
Industrial Needs
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Send the coupon for your copy now!

Jones & Laughlin Steel Corporation
411 Jones & Laughlin Building
Pittsburgh 19, Penna.

Please send me a free copy of the new wire rope handbook entitled "Wire Rope is a Machine."

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Company _____

Address _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Gently DOES IT



**YOU GET MORE
OF THIS**

Non-Explosive

MINING METHODS

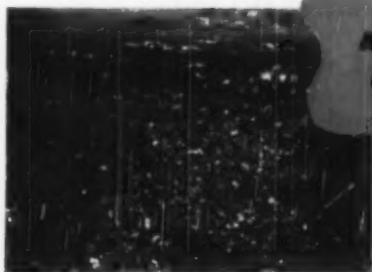
**AIRDOX
CARDOX**

*Treat your coal gently—
it may be worth more
than you know! Let's
look at the facts:*

When you replace the shattering, hammer-like blows of explosives with the gentle, heaving action of AIRDOX or CARDOX, you get more premium price coal in every ton mined. Specifically, you decrease the minus 2" coal by 10% to 15% and reduce the proportion of minus ¼" coal to an even greater extent. But your increased realization goes far beyond that.

Non-Explosive Mining Methods — AIRDOX or CARDOX — break down the face along natural lines of cleavage. Shatter cracks that cause progressively costly degradation are eliminated. Your coal retains its firm structure all the way from face to furnace — even under extensive mechanical handling, long distance shipment and rough handling in the dealer's yard. *Result: — better coal that's easier to sell.*

Add the factors of greater mine safety, easier loading, easier cleaning — and you can see why the most progressive and efficient mines, in greater numbers than ever before, are changing over to AIRDOX or CARDOX Non-Explosive Mining Methods.



**AND LESS
OF THIS**

Note the high percentage of fine sizes in this fall of coal. Typical with permissible explosives.

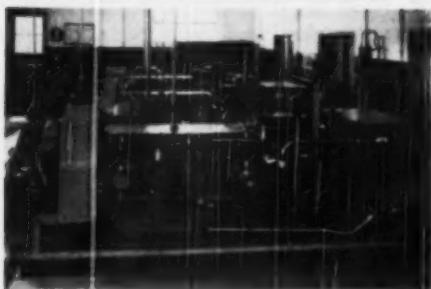


**BECAUSE
OF THIS**

AIRDOX or CARDOX dislodges coal with a piston-like action that produces more loose coal and minimizes shatter cracks.



...and pays a reward in GREATER REALIZATION from face to furnace



AIRDOX

AIRDOX at work! Each of these AIRDOX compressors (left) supplies enough high-pressure air to break approximately 750 tons of coal per 8-hour shift.

AIRDOX dislodges coal with compressed air. Its gentle heaving action shears the rib and top clean... rolls the coal forward in a loose pile for faster loading... reduces hazards of roof failure. It permits on-shift shooting in locations where mine safety laws prohibit use of explosives while men are in the mines. Crews can enter the working face immediately after the fall, enabling greatest possible use of the most modern mechanized equipment.



Operating control valve which releases compressed air in AIRDOX Tube to dislodge coal.

Equipping a mine to take advantage of the economy and safety features of AIRDOX requires practically no change in operating methods. High pressure air, supplied by one or more electrically driven compressors at the surface, is carried into the working sections of the mine through steel and copper tubing. AIRDOX Tubes are inserted into drill holes in the face. Under the remote control of an operator, they discharge compressed air to break the coal. Force is concentrated at the back of the drill hole, where it is most effective. There is no smoke, flame or fumes and very little dust. AIRDOX Tubes may be used over and over again.

which for you — AIRDOX or CARDOX?

Each offers you the benefits of greater realization, greater safety and more soluble coal. Recommendations as to whether CARDOX or AIRDOX better suits your needs will be made after examination of all factors by one of our engineers. Ask for this free survey today. This may well be your first step toward maximum profits from your mining operations.

CARDOX

CARDOX utilizes the gentle but tremendously powerful force exerted by expanding carbon dioxide to dislodge coal. Method of application at the face is in general similar to that for AIRDOX. The CARDOX Tube containing carbon dioxide is inserted in the drill hole. Discharge is directed from a convenient crossout. Discharge does not damage the CARDOX Tube. The Tube is simply returned to the surface for refilling in a small charging plant located at the mine.

In addition to the benefits it confers through greater realization, CARDOX offers



unique safety advantages. It cannot initiate an explosion, will not support combustion. Carbon dioxide is a fast, effective fire extinguishing agent. In many mines CARDOX Tubes are featured as emergency fire extinguishers.

CARDOX CORPORATION • BELL BUILDING • CHICAGO, ILLINOIS

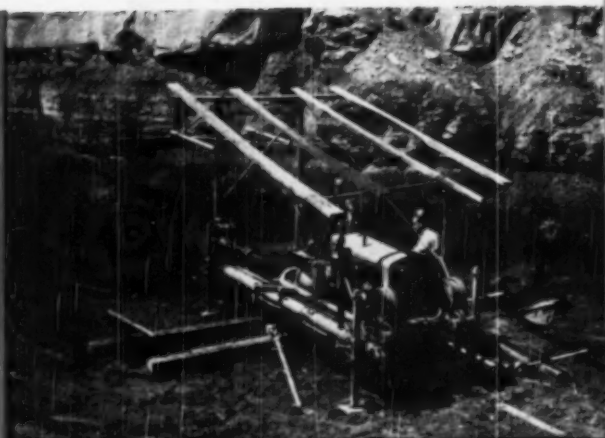
When Recovery Costs Are **OVERBURDENED**

CARDOX-HARDSOCC

DIRECT MINING DRILLS

When overburden removal becomes too costly for further profitable stripping, it's not necessarily the signal to abandon operations. In just such conditions, the CARDOX-HARDSOCC Direct Mining Drill has enabled many mines to continue economical coal production.

These units, designed specially for the purpose, drill into the seam and bring out the coal in a continuous stream. Teamed up with portable conveyors (see illustration), they provide facilities for automatic loading of trucks.



CARDOX-HARDSOCC Direct Mining Drills handle augers up to 40 inches in diameter. Augers to 24 inches are powered by a 32 H. P. engine; larger augers by a 100 H. P. or larger engine. All Direct Mining Drills are available with electric motor drive for underground use.

Augers are in 6-foot lengths that can be quickly coupled. The maximum depth of the drill hole ranges up to 90 feet, depending upon the diameter of the auger and the type of coal.

If you have an overburden problem, investigate. Ask to have a **CARDOX-HARDSOCC** Engineer show you how you can profitably apply a **CARDOX-HARDSOCC** Direct Mining Drill.

NEW MULTI-USE DRILL

reduces costs on many kinds of drilling

CARDOX-HARDSOCG Tractor-Mounted Vertical Drill

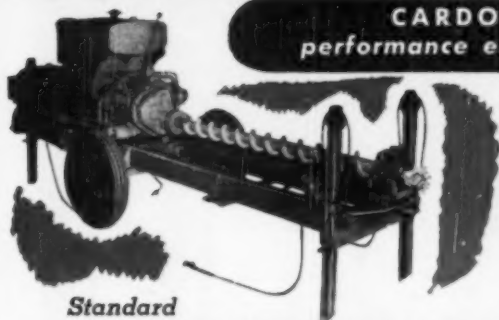


One Unit Handles All of These:

- Rapid Drilling of Stripped Coal
- Crop Line Testing
- Foundation Testing
- Core Drilling

Here's a whole drilling combination in a single economical package! Furthermore, because of its powerful tractor drive you can use this drill in rugged terrain where use of other types of drilling equipment is difficult or impractical. It saves you time on the job — and between jobs — moves from hole to hole or from one site to another with full tractor mobility. The drill is driven by the power take-off of the tractor engine. It easily drills holes up to 6 inches or more in diameter. The augers are in 6-foot sections, available with any standard connections. The unit can be converted from one type of drilling to another in just a few minutes.

CARDOX-HARDSOCG DRILLS *performance engineered to stay on the job!*



**Standard
HYDRAULIC HORIZONTAL DRILL**

Fast on the job — easily towed or trucked from job to job. When set up in a pit it can be readily moved from hole to hole by the operator and a single helper. Available with either air-cooled gasoline engine or electric motor. Standard equipment includes seven 5 1/4" diameter, 6' auger sections for drilling up to 42' in depth. Regular hard-surfaced bits or tantalum-tungsten-carbide cutterheads may be used.

CARDOX-HARDSOCG Hydraulic Horizontal Drills may also be had in self-propelled models — gasoline or electric powered.



**Standard
VERTICAL DRILL**

In the production of coal, clay, gypsum, asbestos and other minerals, users report as many as 110 holes, each 10' deep, drilled in a single day! May be had with air-cooled gasoline engine or electric motor. Weight of the engine or motor forces the auger and cutterhead into the material being drilled. The mast is easily lowered for towing from job to job. The 6' augers may be quickly coupled for drilling deeper holes.

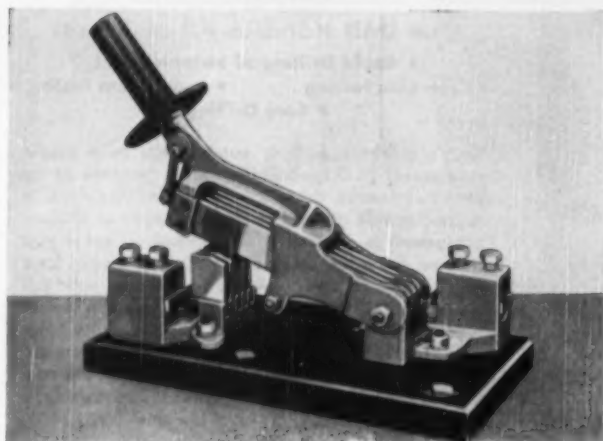
CARDOX-HARDSOCG Vertical Drills are also available in heavy-duty model for very tough, deep drilling jobs.

There's a CARDOX-HARDSOCG Distributor or Representative near you. He can help you step up efficiency and cut your costs. Call upon him *first* whenever you need any kind of drilling equipment.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS



WITH THESE NEW **MOSEBACH** PRODUCTS



Mesco Heavy Duty Feeder Switches are designed for 750 to 1500 ampere applications. Handles equipped with "quick-break," "quick-make" springs. Available in wood or steel boxes, suitable for mounting in any position. Universal Terminals accommodate feeder cables from 250,000 to 1,000,000 CM in size.



Mesco Hydraulic Brake Adjusters are adaptable to most locomotives. Made in any desired length from 10" rod centers up. Can be instantly adjusted, anywhere, at anytime . . . wherever a grease gun is available. (Using any standard gun, motorman can handle adjustment.) Rugged . . . safe . . . eliminates sudden "let-downs" . . . easy to install.



Mesco Shock Absorber was developed for shuttle car use, but, with adjustments, can be used on other mine machinery. "Dead-ends" cables and allows slack for connecting cables to junction boxes or other power sources. Protects cables . . . limits splicing operations . . . saves time. Can be securely bolted to roof or chained to timbers or rail. Recommended for use on electrical, hydraulic or clutch-driven reels.

Each one of these new MESCO products has been carefully engineered to help you get the highest possible efficiency from your haulage system equipment. They offer you exclusive, money-saving advantages found in no other products of their type and are well worth your immediate investigation.

These new MESCO products are part of our complete line of track and trolley products, which include MESCOWELD rail bonds, section switches, and trolley wheels. For information see your nearest distributor or write direct.



MESCO Clamp Type Trolley Taps feature a heavy bronze 2 1/2" long clamp which holds the trolley wire firmly and positively for working in one locality for a definite period of time. Actuated by an Acme thread which cuts dirt and rock dust. Accommodates either stud type or ferrule type one-time, powder-packed fuses.

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*Big and Strong...
Better than Ever...*

**MARION
111-M**



Machine illustrated has Diesel power with electric swing.
Also available as full Ward-Leonard Electric machine.

MARION gave the industry a new conception of excavating equipment in 1946 when the MARION 111-M was introduced. Here was a 3½-4 cu. yd. machine with all of the benefits of Diesel power PLUS all of the advantages of electric swing. Big enough for high daily yardage, yet easily moved from one job to another. Power enough to stand up to big jobs without flinching. Heavy enough to be steady on its long, wide crawlers.

Now—the MARION 111-M is bigger and stranger—better than ever. It is a thoroughly field-proven machine, piling up performance

records that are truly impressive. (Write for copies of letters from 111-M owners.)

Regardless of whether you have seen the MARION 111-M before, you should see it today if a 3½-4 cu. yd. machine has a logical place in your operations. It's a rugged, heavy machine as a shovel or dragline with power and strength to spare.


The 111-M is an important new tool for heavy-duty material handling. Get the full story from your MARION representative or write to the factory for information.

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EQUIPMENT BETTER PROTECTED AT LESS COST

**Sun Mine Grease Again Proves Its Superiority,
Keeps Loaders Working—Builds Up the Profits**

This loader, one of 36 in a western Pennsylvania mine, can fill a 5-ton car in a couple of minutes. That's action, and it takes more than an ordinary grease to protect the bearings and drives.

At first the mine used a product that formed gummy deposits in the bearing-grease reservoir. This kept fresh grease from reaching the bearings and caused excessive wear. Subsequently other products were

tried out—with somewhat better results. But in every case the price was higher than good business-judgment could approve.

Next the mine turned to a "Job Proved" Sun mine grease, known to many producers for its performance plus economy. In over 18 months there has not been a single breakdown due to lubrication, even with the equipment occasionally overloaded. Much of the time the

loaders run at top capacity. Output is high—and profitable. Grease costs are low.

There are "Job Proved" Sun mine oils and greases for every lubrication need, whether in producing, transporting, or processing.

Wherever used, these products are contributing to economical operations. Call in your nearest Sun Industrial Products man for consultation on your problems.

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SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY





Coal's Future Good, Love Tells Utility Men

"During the last decade the bituminous coal industry has become a progressive, energetic and modern business. Its achievements are symbolic of what private ownership can do under adverse circumstances," George H. Love, president, Pittsburgh Consolidation Coal Co., said in an address to the members of the Edison Electric Institute, at its annual meeting in Atlantic City June 7. "If we use efficiency and productivity as the measure in relation to performance in foreign countries, our coal industry is at the head of all domestic industries," he pointed out.

Maintaining that the coal industry needs no help through special legislation, Mr. Love warned his listeners of the dangers of government regulation in coal. "I know that regulation and price fixing in coal can only lead to government ownership, and if such becomes the pattern for coal, it may inevitably become the pattern for your industry and many others," he said. The coal industry today has an excess capacity of 150 million tons, he declared, but much of that is in high-cost or inefficient operations and the industry can liquidate its overcapacity in an orderly fashion.

The principal problems in coal that must be solved, Mr. Love said, involve: (1) labor relations; (2) competition within the industry; (3) competition from other fuels; and (4) maintaining earning ability to permit continued progress.

He expressed optimism on the future of labor relations, stating that the industry will prosper if it accomplishes its no-strike goal. Progress was made in the last wage negotiations, he pointed out, when 5,000 units stood behind "an inexperienced amateur negotiating committee" to obtain "a compromise which the industry could absorb and is absorbing." Part of the industry is "now proceeding to effect a permanent organization with the best possible experts to be in charge," he told the group.

In discussing intra-industry competition and the present overcapacity, Mr. Love stated his opinion that there

is a present market for 450 million tons of bituminous coal a year, but that a capacity of 500 million tons annually is necessary to handle that demand.

Oil and gas competition "is severe, and while we don't exactly welcome it, we accept it under a free enterprise system," Mr. Love said. "There is plenty of room in this country with its expanding requirements for energy to permit all three of these major

(Continued on p. 228)

Northern Operators Delay Bargaining Organization

Announcement of the formation of a permanent bargaining organization by northern bituminous coal operators was being delayed by organizational difficulties, it was reported late last month. Reluctance of several operator associations and individual operating companies to accept the plan as set-up (*Coal Age*, June, p. 131) was expected to prevent the group opening a Washington office July 1 as had been planned.

According to the reports, the Central Pennsylvania Coal Producers' Association agreed to join the organization, but withdrew after several members resigned because of its acceptance. Directors of the Ohio Coal Association reportedly are split on the question and are deferring action. Operators in both Indiana and Illinois also are still considering participation.

Among the objections to the organization cited in the reports are the requirements that members agree to participate for 3 yr and the payment of a year's dues in advance. Some operators also fear the domination of the captive interests and that of the larger producing companies.

The group backing the organization, headed by George H. Love, president, Pittsburgh Consolidation Coal Co., reportedly is planning a meeting in Cleveland July 11 to consider further action to interest the dissenting groups.

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Senate Hearings Assess Foreign Oil Damage

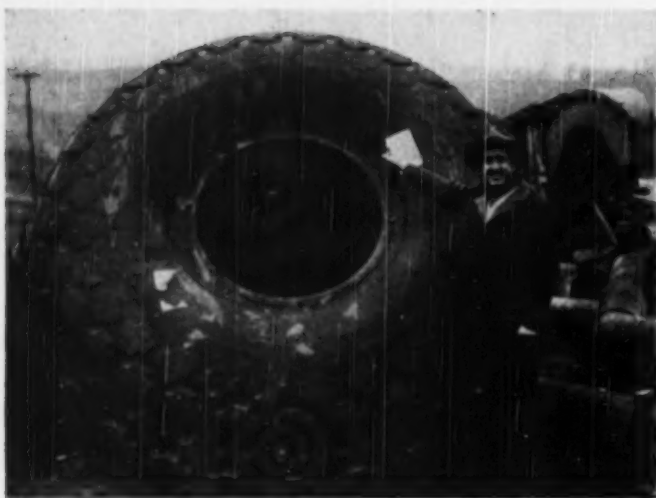
A detailed case against continued large-scale imports of foreign oil was emphatically documented by a parade of witnesses appearing last month before the Neely subcommittee of the Senate Labor Committee investigating unemployment in the coal, railroad and other industries.

Not only is the cheap foreign oil causing widespread unemployment in both the coal and railroad industries, but it also is seriously disrupting the economy of many areas and constitutes a real threat to future national security, coal leaders, railroad, labor and independent oil representatives, several Congressmen and state governors told the subcommittee.

The damaging flood of imports must be lessened by passage of bills now in Congress providing for an import tax of \$1.05 per barrel, witnesses repeatedly told the subcommittee. Following conclusion of the hearings, the subcommittee began preparation of its report, which was scheduled to be submitted on or before June 25.

Typical of the testimony of many witnesses was that of L. Ebersole Gaines, president, New River Co., who said: "Production costs of foreign oil are so low that American coal or oil produced under our American labor standards cannot compete with it. The coal industry is faced with the prospect of being reduced in size and strength to such an extent that it cannot be considered a dependable source of fuel and energy in time of need. If this foreign oil continues to be dumped, coal mines will go out of existence and coal miners will be

(Continued on p. 234)



Nearly 2 Tons of Rubber Tire

CHARLES E. COMPTON, owner and manager, Grafton Coal Co., Clerksburg, W. Va., stands beside one of five heavy duty "Gum-Dipped" special tires built for him by Firestone. The tires will be used on a new rock wagon to be employed in coal stripping. The casings alone weigh 2,926 lb each. Assembled with the inner tubes and flaps, they will weigh close to 2 tons. This tire has a diameter of 10 ft, a rated size of 36:00x40 and rated carrying capacity of 40 tons. It consists of 40 rayon plies.

Personal Notes

Thomas J. McParland, general superintendent, West Virginia and Kentucky Divisions, U. S. Coal & Coke Co., Gary, W. Va., retired May 31, after 52 yr of service with the company. Mr. McParland, who was honored at a dinner given for him, began his career as a trapper boy at a Uniontown, Pa., mine. He later held various supervisory positions and was named general superintendent in 1939. William R. Stedman, assistant general superintendent since 1937, was named general superintendent of the divisions to succeed Mr. McParland. Lloyd M. Lineberry, formerly superintendent No. 2 mine, has succeeded Mr. Stedman as assistant general superintendent.

Chester J. Huenefeld, vice president, Webb Coal Mining Co., and president and treasurer of the Webb Fuel Co., its sales agents, is retiring after more than 40 yr of continuous service with the companies.

Richard E. Hoagland has been named vice president and assistant general manager of the Utah Fuel Co., with headquarters in Salt Lake City, according to Jack L. Ashby, vice president of the parent company, Kaiser Steel Corp. Mr. Hoagland formerly served as manager of by-product sales for Kaiser Steel, directing the marketing of the great variety of coal by-products produced at the

company's Fontana, Calif., steel mill.

Warren H. Moss, Morgantown, W. Va., has been appointed public relations director of the Hanna Coal Co. to succeed W. H. McWilliams, who recently resigned to take over publication of the *Tri-County Lantern*, weekly newspaper at Adena, Ohio.

Old Timers Club Honors Penn State Senior Student

L. C. Campbell (right), vice president, Eastern Gas & Fuel Associates, presents an inscribed gold watch to William Fraser Bates, as the Old Timers' Club award to the "Outstanding Senior Student, Penn State College, Class of 1950, Coal Mining Engineering." The presentation was made May 10 at a meeting of the Penn State Student Chapter, AIME.

The award was followed by a discussion of "Opportunities for Mining Engineers in Industry," in which various industry representatives participated. Policy regarding employment of graduate mining engineers was outlined by several company representatives, and an open panel discussion conducted by the faculty sponsor permitted an exchange of information among students and industry representatives. Serving on the panel were: C. B. Sims, district manager, Cardox Corp.; J. L. Acuff, personnel officer, and Richard Mote, mining engineer, USBM; H. E. Gustafson,

Several changes in personnel have been reported at mines of the Eastern Gas & Fuel Associates. N. S. Stillwell, Maynard Honaker, L. B. Baker and F. D. Vinton, formerly foremen at the Maitland mine, and H. C. Headly, formerly at the Crozer mine, have joined the supervisory staff of the Keystone mine. Rufus C. Jarrett, previously at Helen, Carswell and Keystone mines, has become a section foreman at Kopperston No. 2 mine. Felix Schleenvoigt, formerly at Grant Town, is doing some special work at No. 2 mine. William G. Saul, previously at Powellton No. 3, has been made conveyor foreman at Powellton No. 6, replacing Sylvan Meadows, who has returned to his former position.

John D. Cooner joined the staff of the U. S. Bureau of Mines Anthracite Research Laboratory at Schuylkill Haven, Pa., July 1, as mining engineer in charge of mining research. Mr. Cooner has been with The Hudson Coal Co., Scranton, Pa., since 1916 after receiving a mining engineering degree at Pennsylvania State College. His successive positions with the company have been student engineer, assistant mine foreman, machine mining engineer, assistant to chief engineer, supervisor of students, safety inspector, assistant colliery superintendent, and safety engineer from 1945 until his appointment to the laboratory staff. From 1917 to 1919 he served with the U. S. Army and was wounded in action in France. Mr. Cooner pioneered the anthracite dust-suppression program after considerable study and research throughout the U. S. and Canada. He is past president of the Anthracite Safety Engineers' Association and a member



works manager, National Gypsum Co.; Richard Maize, Pennsylvania Secretary of Mines; and J. L. Sullivan, general supt., H. C. Frick Coke Co.

You can get HIGHER THAN 99% separating efficiency

Records from mine after mine prove that. They show that you can get close to 100% recovery of salable coal when it's cleaned by the Chance "heavy density" Sand Flotation Process, which has the *highest separating efficiency* of all coal-cleaning equipment. In addition, you get:

The most dependable performance — steady, uniform, trouble-proof operation. Specific gravity of mixture remains constant; efficiency of separation is unaffected by fluctuating loads and varying percentages of discard.

Highest degree of flexibility — ability to handle coal at operating gravities from 1.35 to 1.65, with size range as wide as 10" x 1/4" to one washing unit.

Lowest cost per ton cleaned — low cost power, operation, maintenance, depreciation.

Easiest operation — change-over from one washing gravity to another can be made in about five minutes, simply by opening or closing valves... all under one-man control.

Meet increasing competition of other fuels... and within your own industry... by upping the standard of your coal. Earn the top market prices that top quality coal commands. The Chance Process will help. Our engineers will be glad to cooperate with you in solving any of your coal-cleaning problems.

**CHANCE
PROCESS**



THE HEART OF THE PREPARATION PLANT

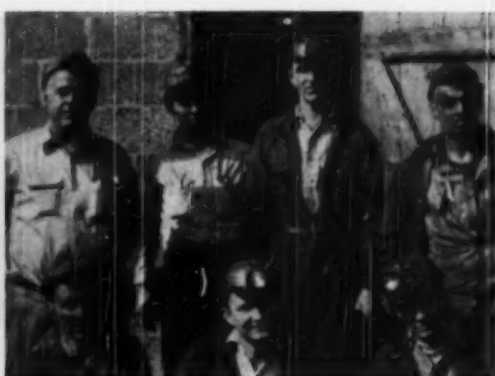
UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK 17 • PHILADELPHIA 5 • CHICAGO 2
WITH A BACKGROUND OF OVER SIXTY YEARS' EXPERIENCE

COAL MEN ON THE JOB



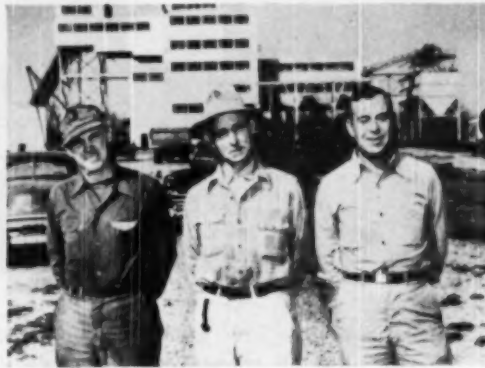
TIPPLE STAFF shown in the office at the Ayrshire mine, Ayrshire Collieries Co., Oakland City, Ind., includes: M. H. Pittman (seated), weighmaster; Luther Hale, tippie superintendent; Elza Jones, track foreman; and William Nordhorn, storekeeper. Visitor at the right is F. P. Klous, field engineer, Streeter-Ames, Chicago.



MINE OFFICIALS of the Sewell Chief mine, Woolbridge Coal Mining Co., Richwood, W. Va., are: Front row—John Cartright (left), D. M. Blake and John Wasclehall, section foremen. Rear row—J. B. Bennett, superintendent; Carl Houghton, general mine foreman; Reid Taylor, night mine foreman; and Chester O'Dell, section foreman.



SUPERVISING OPERATIONS at the Wasson Coal Corp., Boonville, Ind.; Conrad Autry (left), pit foreman; W. G. Wasson, superintendent, and Charles W. Burkett, chief engineer.



AT THE MORGAN COAL CO., HERRIN, ILL.: H. W. Jeffers (left), superintendent; R. A. Smathers, land agent; and W. F. Evoland, billing clerk.

More Coal-Men-on-the-Job pictures appear on other pages in this section.

of AIME, Mine Inspectors' Institute of America and Coal Mining Institute of America.

D. C. Stewart has been named to head the newly established industrial relations department of the EG&FA Coal Division, according to an announcement by L. C. Campbell, vice president. Mr. Stewart will have his headquarters in the company's Pittsburgh office.

Harold Ford, formerly with the Kentucky Department of Mines and Minerals, has joined the W. G. Duncan Coal Co., Greenville, Ky., as assistant mine foreman at the Graham mine.

Marlin J. Weber, formerly manager of mines, has been elected operating vice president of the Bird Coal Co. and its wholly owned West Virginia

subsidiary, the Barnes Coal Co. Mr. Weber will continue to maintain headquarters at the companies' operating offices in Tire Hill, Pa., and Dawmont, W. Va.

A. B. Crichton, Jr., vice president operations, Johnstown Coal & Coke Co., Johnstown, Pa., a mining engineering graduate of West Virginia University, was awarded the professional degree of Mining Engineer at the university's recent commencement exercises.

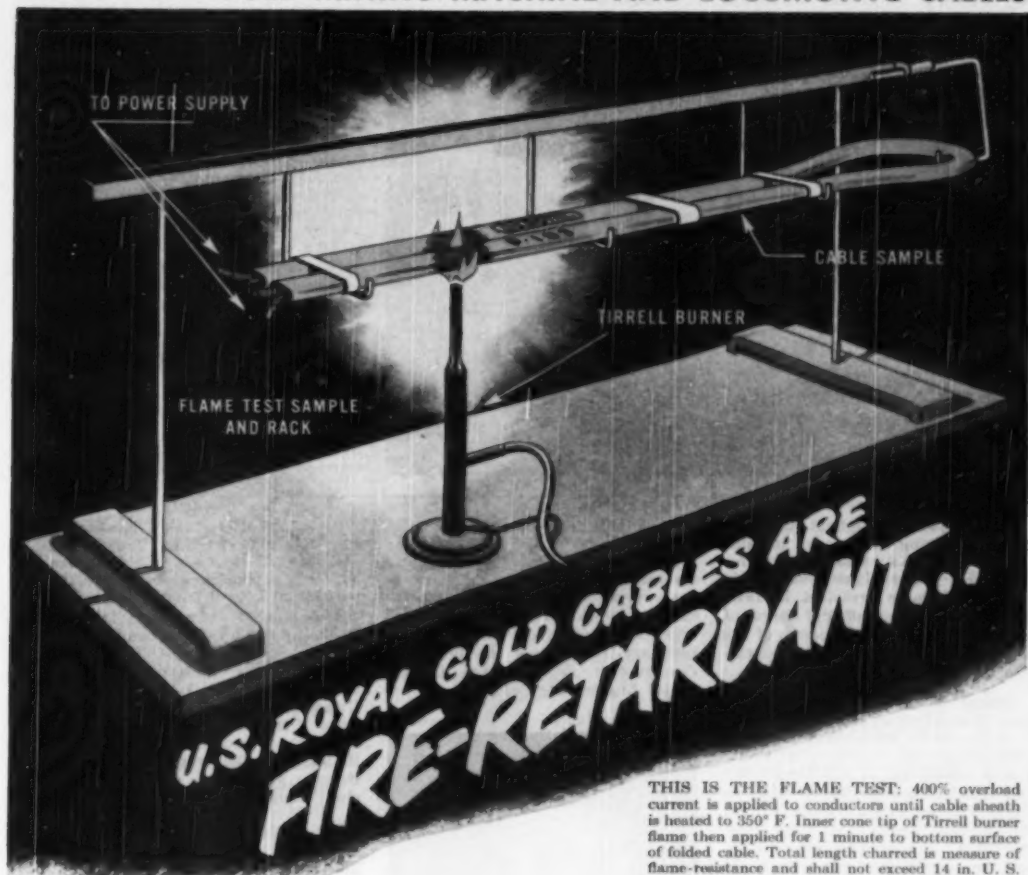
Charles H. Lambur, president, U. S. Collieries, Inc., New York, sailed early last month for Europe and will spend several months in mine consulting work, visiting Turkey, Greece, Italy and France. He is expected to return to the United States about Oct. 1.

William Haydon Roll, mining engineer and executive assistant, Kentucky Department of Mines and Minerals, was awarded the professional degree of Mining Engineer at the University of Kentucky in Lexington, June 2. Mr. Roll graduated from the university in 1925 with a degree of BS in Mining Engineering.

Obituaries

David W. Martin, 53, president of the Wyatt Coal Co., Wyatt Coal Sales Co. and McAlpin Coal Co., died May 23 at this home in Charleston, W. Va., following an illness of 2 yr. Mr. Martin had lived in Charleston for practically all his life and was

U. S. ROYAL GOLD MINING MACHINE AND LOCOMOTIVE CABLES



THIS IS THE FLAME TEST: 400% overload current is applied to conductors until cable sheath is heated to 350° F. Inner cone tip of Tirrell burner flame then applied for 1 minute to bottom surface of folded cable. Total length charred is measure of flame-resistance and shall not exceed 14 in. U. S. Royal Mining Cables pass test with extra margin of safety.

7 Reasons Why These Yellow Jacket Cables Mean Safety!

A severe Flame Test must be passed by U. S. Royal Cables before they are approved as "Fire Retardant" by U. S. Rubber engineers. They bear the Label P-103, given by the Pennsylvania Department of Mines in token of conformity with their strict fire prevention regulations. Six other gruelling tests guarantee U. S. Royal's resistance

to abrasion, cutting, moisture, cold, impact and flexing. The bright yellow color gives U. S. Royal Gold the highest visibility. Available also in black. For descriptive folder write Electrical Wire and Cable Dept. United States Rubber Company, Rockefeller Center, New York 20, N. Y.



PRODUCT OF



UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Big Sandy Elkhorn Officials Re-Elected



widely known throughout the coal industry, having been active in mine operation in Kanawha County for 31 yr. He joined Wyatt Coal Co. in 1919 and became president in 1943. He was a member of the board of directors, and a past-president, of the Kanawha Coal Operators' Association.

George W. Grove, 63, a veteran of more than 35 yr of service with the U. S. Bureau of Mines, died June 5 in a Pittsburgh, Pa., hospital after a long illness. Stationed at Pittsburgh, Mr. Grove had served as chief of the Accident Prevention and Health Div. of the Bureau's Region VIII since October, 1949. For 10 yr previously, he had been supervising engineer of the Bureau's District A, Health and Safety Div. He was author of many of the Bureau's publications and was widely known as an authority on coal-mine safety work. He served as secretary-treasurer of the Coal Mining Institute of America, the Mine Rescue Veterans Association of the Pittsburgh District and as president of the National Mine Rescue Association.

Harvey J. Nelms, 67, vice president and general manager, Ohio & Pennsylvania Coal Co., died May 29 at his home in Cadiz, Ohio. Mr. Nelms had been associated with the company for some 20 yr and is survived by his brother, Joseph P. Nelms, who is president of the organization. A native of Pottsville, Pa., Mr. Nelms spent his early business life in the mining area of Western Pennsylvania and for some years was in charge of operations for the Crucible Steel Co.

Stephen J. Quinn, 63, superintendent of strip mining for the Youngstown Sheet & Tube Co., died May 19 at St. Elizabeth Hospital, Youngstown, Ohio. Mr. Quinn suffered a stroke about a year ago but had re-

covered and returned to work. He had become ill about a week before his death and entered the hospital several days previously. For many years previously, he had been associated with Galitsin Reilly, a railroad construction firm, and also had been secretary-treasurer of the Interstate Construction Co. and the Central States Engineering Co.



P. A. Grady

P. A. Grady, 67, of the accident-prevention bureau of the W. Va. Department of Mines, died June 17 in a Charleston, W. Va., hospital. He had been hospitalized two days earlier following a heart attack. Mr. Grady was one of the first mine inspectors in the state of West Virginia and at one time was with the Carrs Fork Coal Co., at Hazard, Ky. He was a past-president of the Mine Inspectors' Institute of America and was its last charter member from West Virginia. He also was a past-president of the Kentucky River Mining Institute.

Harry R. Stanton, treasurer of the Anthracite Institute, died June 9 in

OFFICERS of the Big Sandy-Elkhorn Coal Operators' Association re-elected at the annual meeting held in Lexington, Ky., June 2, are: treasurer, J. R. Hurt (left); executive secretary, H. S. Homan; president, B. F. Reed, Turner Elkhorn Mining Co.; chairman of the board, Harry LaViers, Southeast Coal Co.; and vice president, W. W. Goldsmith, Elkhorn Coal Corp.

At the meeting, Raymond E. Salvati, president, Island Creek Coal Co., was elected to the board of directors to fill a vacancy caused by the resignation of Virgil Picklesimer. Directors re-elected, in addition to the officers, were: H. K. English, S. M. Cassidy, G. O. Tarleton, A. P. Boxley, Edgar Dale, W. F. Ploch, R. D. Davis, D. L. Francis, Joseph Harris, A. M. Ayers, J. R. Hurt, A. H. Mandt, J. E. Bowman and R. A. Hedland. The appointment of T. K. English, Pikeville, as labor adviser, and J. H. Mosgrove, Pikeville, as safety director, was announced by Mr. Reed.

the General Hospital, Wilkes-Barre, Pa., following a brief illness. Mr. Stanton had been actively identified with the anthracite industry for the past 32 yr, having joined the Anthracite Bureau of Information in 1918. At the time of his death, in addition to his position with the Anthracite Institute, he was secretary of the Anthracite Operators' Wage Agreement Committee; treasurer, Operators' Fund of the Anthracite Board of Conciliation; treasurer, Anthracite and Bituminous Tidewater Emergency Bureau; and auditor for the Anthracite Committee.

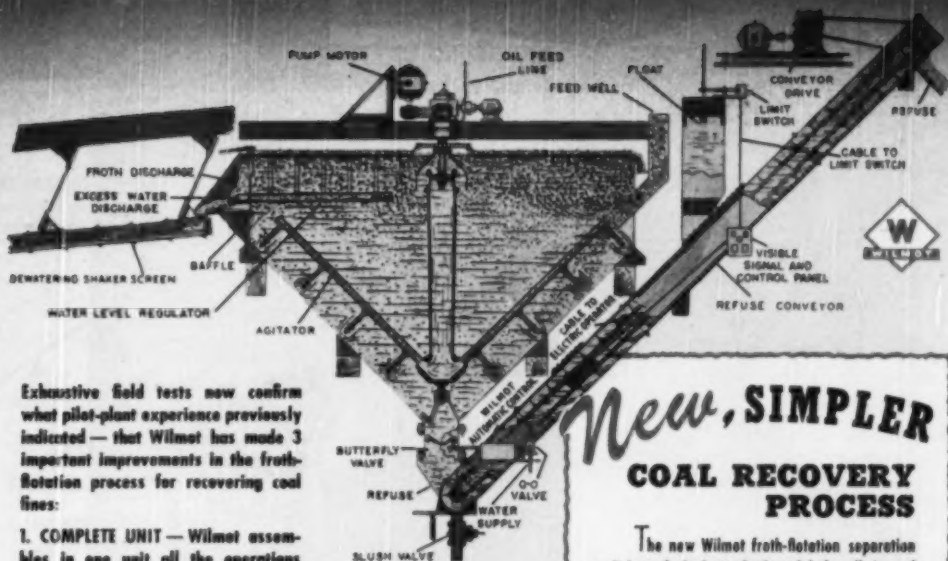
House Committee Kills UMWA Strike Inquiry

Investigation of last spring's work stoppage and John L. Lewis' reputed use of "secret signals" by a subcommittee of the House Education and Labor Committee was barred last month, as the full committee voted June 15 to discontinue the inquiry.

The subcommittee previously had had its power to subpoena Mr. Lewis revoked by Rep. Lesinski, chairman of the full committee, but was planning to continue its investigations (*Coal Age*, June, p 136). Rep. Graham A. Barden (D., N. C.), who succeeded to the chairmanship of the committee on the death of Rep. Lesinski, announced that the committee had agreed with his decision to drop the subject. Rep. Barden had been reported as "unfriendly to labor" in the past and his discontinuation of the inquiry came as a surprise to some Washington observers. Rep. Andrew Jacobs (D., Ind.) who, as chairman of the subcommittee, had previously sought power to subpoena Mr. Lewis, had no comment on the group's action.

Wilmot Announces an

IMPORTANT DEVELOPMENT in Froth-Flotation Separation



Exhaustive field tests now confirm what pilot-plant experience previously indicated — that Wilmot has made 3 important improvements in the froth-flotation process for recovering coal fines:

1. **COMPLETE UNIT** — Wilmot assembles in one unit all the operations which, in other systems, require multiple units. Result: savings in floor space, operating time, supervision.
2. **LOWER OPERATING COSTS** — Labor, power and maintenance costs for Wilmot's single unit are substantially less than for multi-unit processes. Cost of oil per ton of clean coal is 2/3 less.

35% INCREASE IN MARKETABLE FINES

3. **OIL-FREE PRODUCT** — The Wilmot process uses less oil, and the period of contact with oil is shorter. Result: the product does not pack, facilitating handling; less smoke and soot.

In the field, unit is maintaining a sharp separation at $-3/64$ to $+100$ mesh, thru wide variations in quality and quantity of intake. Average increase in yield of marketable fines is 35%; increase in applicability and efficiency of the method is impressive. Bulletin FF501 gives full details of this new way to increase your yield and profits.

New, SIMPLER COAL RECOVERY PROCESS

The new Wilmot froth-flotation separation unit is made in 4 standard models for all sizes of plants: cone diameters, 6 ft., 9 ft., 12 ft., 16 ft.; clean coal capacities per hour, 9 to 80 tons. Recovers fines of $-3/64$ to $+100$ mesh size. If total recovery is desired the addition of a second unit will recover material from -100 mesh to $+0$ mesh. Field engineers always available.

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BULLETIN FF501

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yield and efficiency records of
field installations.

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QUICK FACTS

High set end pieces keep hinges and temples from blocking vision.

Light but strong keyhole bridge has ample face form for added protection and comfort.

Lenses are orbit-shaped—conform to and cover eye for maximum utility and appearance.

Nose pads have broad bearing surfaces for extra comfort.

Available with comfort cable temples (metal core for easy adjustment) or skull temples (extra strong wire core, acetate-enclosed).

Lenses are 6 Curve Super Armorplate clear or Calobar types in medium, dark or extra dark shades. May be fitted with Super Armorplate lenses accurately ground to worker's own prescription.

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SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

You can smooth-out overloads

INNER AREA OF TANK FLOOR
SERVED BY TWO SHORT TORQ ARMS

OUTER AREA OF TANK FLOOR
SERVED BY TWO LONG TORQ ARMS

with the

4-ARM DORR TORQ

DORR EQUIPMENT for coal preparation plants

DORR TYPE A THICKENERS & HYDROSEPARATORS
center shaft units . . . up to 50' in diameter . . .
for regular duty.

DORR TYPE H HYDROSEPARATORS
center shaft units . . . 40' to 100' in diameter
. . . for heavy duty operations.

DORR TORQ THICKENERS & HYDROSEPARATORS
center pier units . . . 60' to 200' in diameter
. . . particularly adaptable for water recovery.

DORR TYPE PL THICKENERS & HYDROSEPARATORS
center pier units . . . 100' in diameter and up
. . . for special heavy duty operations.

DORRCLONES (DUTCH STATE MINES CYCLONES)
new cylindro-conical units utilizing centrifugal
force . . . show promise for certain hydrosepara-
tion steps in the coal preparation flowsheet.

DORRCO TYPE W PUMPS
heavy duty, duplex, diaphragm pumps . . . for
hydroseparator and thickener underflows . . .
two sizes with top capacities of 30 and 75
cubic feet per minute.

You can bypass overload and shutdown problems with 4-arm Dorr Torq Thickeners and Hydroseparators. Here's why:

Raking load is distributed between two sets of arms . . . one long and one short . . . both utilizing the automatic, self-lifting Torq principle. The long arms rake the outer section of the tank floor. The short arms take over the load in the inner section, raking the solids to a conventional center-cone discharge. Each set of rakes functions independent of the other.

Mechanically, this provides maximum overload protection for every eventuality. You can start-up a 4-arm Torq under load after a weekend or extended shutdown . . . in short, can forget overload worries.

The 4-arm Torq is only one of the Dorr units adaptable to modern coal preparation practice. We'd like to give you detailed information on any of those listed at the left.



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RESEARCH — ENGINEERING — EQUIPMENT



MR. WALKER—Outside threats to coal require unified purposes and pooled strength.



MR. SCHULTEN—Coal needs markets. It can't compete with dumped foreign oil.



MR. DOWD—Increased stripping and new mining methods affect coal reserve estimates.



MR. IRELAND—Hard-working, optimistic men will keep coal in business for a long time.

Pennsylvania Strippers Scan Issues

THE EXTENT OF COAL RESERVES in Pennsylvania, proposed laws affecting the coal industry, acid mine drainage and strip-land reclamation were top subjects at the annual meeting of the Mineral Producers' Association, Pittsburgh, Pa., June 2. High spot of the evening banquet was an address by R. L. Ireland, chairman, executive committee, Pittsburgh Consolidation Coal Co.

Keynoting the afternoon meeting, which followed a closed business session at noon, R. S. Walker, association vice president and president, Bradford Coal Co., urged the industry to unify its purposes and pool its resources and strength to protect itself against dangers from the outside. These dangers, not inherent in the industry, are foreign oil imports, which are damaging strip and deep mining throughout the nation; and bureaucracy in federal and state governments, which imposes restrictions on free enterprise.

"The emphasis today is on the ability of industry to meet national emergencies. Coal is a strong industry and is fully capable of running itself and meeting emergencies provided it is given a fair shake competition-wise," Mr. Walker said.

Methods for estimating known recoverable reserves of coal, particularly coking coal in Pennsylvania, were outlined by James J. Dowd, mining engineer, USBM, Pittsburgh. Reviewing the various estimates made in years past, Mr. Dowd cited the increase in stripping, changing mining methods and various percentages of recovery as factors to be reckoned with in revising estimates

of reserves. The survey now being undertaken by the Bureau of Mines, when complete, will produce a reasonably accurate measurement of recoverable reserves in the United States as well as in Pennsylvania.

Pending legislation and recently enacted laws affecting the coal industry were summarized by Walter F. Schulten, Pittsburgh Consolidation Coal Co. Putting greater stress on proposals to curb imports of foreign oil and thus eliminate unfair competition for coal, Mr. Schulten asked for concerted effort by coal and other affected industries in behalf of a tariff on crude and residual oil. Reliance on foreign oil, besides depriving coal, railroad and other workers of their jobs and displacing great quantities of coal, is a weak link in our nation's defense, he warned. "Coal must stay strong. To stay strong, it needs markets. It cannot compete with dumped foreign oil."

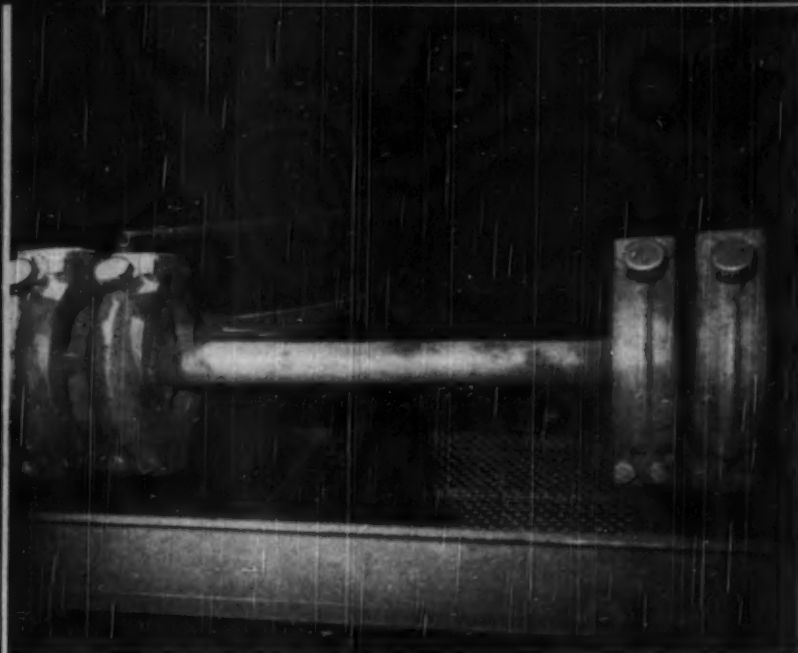
Proposed legislation that will affect coal directly or indirectly includes the following, Mr. Schulten pointed out: the Robertson bill, which would curb union-monopoly powers; the Neely bill, which would provide federal mine inspection; the social-security bill, which would boost benefits about 70%; the St. Lawrence Seaway project; restoration of basing-point privileges; new securities legislation, which would require further registration of stock issues; anti-trust proposals, which would forbid mergers that restrict competition; revenue proposals, with changed provisions for depletion allowances; and investigations of coal and other fuels industries.

Acid mine drainage can hurt the coal industry by making water unsuitable for steam generation, warned S. A. Braley, senior fellow, Mellon Institute, Pittsburgh. Asserting that the Sanitary Water Commission of Pennsylvania does not aim at restricting the coal industry but at learning the facts that will give an equal break to all, Mr. Braley pointed out that closing down mines will not solve the acid mine-water problem because most of the damage was done long ago and because much of the present stream pollution comes from free-flowing mines long shut down.

The actual quantity of acid in the water, rather than the pH factor, is the true index of the damaging effects of acid mine water, Mr. Braley contended. Acidity varies greatly from day to day and month to month and is proportional to the rate of flow through and from the mine. Another factor in acid formation is time, since ferric and sulfuric materials need time for oxidation.

The solution of the acid mine-water problem is not easy, Mr. Braley warned. However, he suggested that coal strippers either keep old water permanently within the pit or if there is likelihood that the pit water will overflow when it rains, prevent water from accumulating. Satisfactory fishing waters usually can be provided in strip pits if the pits are flooded immediately to cover oxidizable materials and if the spoil banks do not contain oxidizable materials above the water level.

Reclamation of stripped lands is a big problem for foresters and land-use experts and will become more



Helps eccentrics keep their bearings . . .

A large midwest coal mine has tested a number of products for the lubrication of screen eccentric bearings. None of these lubricants, however, has equaled the performance of a SUPERLA Grease recommended by a Standard Oil lubrication specialist. This SUPERLA Grease has successfully handled the job during 30 years of hard service. It has prevented bearing failures and minimized maintenance because of these lubricating qualities:

High load carrying ability. SUPERLA's strong lubricating film keeps wear at a minimum, protects bearings against shock loads.

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Stability to oxidation. Because of their

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highly stable composition, SUPERLA Greases resist changes produced by oxidation, retain their original condition longer than conventional products do in storage and in use.

These qualities of SUPERLA Greases will reduce bearing maintenance in your mine not only for screen eccentrics but for a great variety of tippie, shovel, and underground equipment.

Discuss the advantages of SUPERLA Greases with a Standard Oil lubrication specialist. His headquarters are near your mine. How you can benefit from his services is explained at the right.

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What's YOUR problem?



H. Dillingham, lubrication specialist at Standard Oil's Evansville (Ind.) office, has helped this midwest mine solve vital operating and maintenance problems through his recommendations of lubricants. Within easy reach of the mine, he has given operators engineering service when they needed it.

There is a corps of such Standard Oil lubrication specialists throughout the Midwest. You'll find one located near your mine. Through special training and a lot of practical experience, this man has gained a working knowledge of lubrication that can mean real savings for you. You can obtain his services by contacting the nearest Standard Oil (Indiana) office. Discuss with him the savings you can make with such outstanding products as:

STANOIL Industrial Oils. Here's one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA Mine Lubricants. These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants. On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY (INDIANA)





JUST ONE TABLE OF THE PITTSBURG & MIDWAY employees who were among the 67 guests of the Bituminous Casualty Corp. at a banquet given May 4 to honor company employees who served on "Safety Sponsor" committees last year. Left to right are: Henry Neher, foreman, Mine No. 15; Demar Bosidrenghien, mechanic; Mike Naccarato, roddman; Elmer Kelsey, shovel engineer; Leo Young, prospect driller; and Ralph Wright, mechanic.



CENTRAL CLEANING PLANT REPRESENTATIVE, Ray Charlton (center), receives the winner's certificate in P & M's company-sponsored safety contest from H. C. Bray, Kansas City manager, Bituminous Casualty Corp. Looking on is H. B. Farrey, Bituminous Casualty safety engineer.

P & M "Safety Sponsors" Enjoy Banquet

IN RECOGNITION OF THEIR SERVICE in the prevention of accidents, the Bituminous Casualty Corp., Rock Island, Ill., gave a Safety Banquet May 4 for all employees of the Pittsburgh & Midway Coal Mining Co., Pittsburgh, Kan., who had served as "Safety Sponsors" during 1949.

Safety Sponsors are employees chosen by fellow workers to serve for a 3-mos period on the Safety Sponsor Committee. They make weekly inspections and assume the responsibility of reporting mechanical hazards, unsafe working conditions and unsafe acts in their particular department or group. This work has called management's attention to many unsafe conditions and has helped materially to establish good safety records.

This year's banquet was held at the Bessie Hotel in Pittsburgh with 67 guests present. Guests, in addition to Pittsburgh & Midway officials, were: John Delplace, chief mine inspector, Ernest Shaw, deputy mine inspector, and John Cartwright, supervisor of mine rescue, state of Kansas; and Louis S. Kovash, coal mine inspector, USBM, McAlester, Okla.

Hosts representing the Bituminous Casualty Corp. were W. C. Bray, manager, Kansas City, Mo., branch office, and H. B. Farrey, safety engineer for the area. C. F. Herbert, superintendent, safety engineering department, Rock Island, Ill., sponsor of the banquet, was unable to be present.

A certificate for "Outstanding Safety Achievement" was presented by Mr. Bray to Ray Charlton, represen-

tative of the central cleaning plant, as an award for winning the company's inter-mine safety contest. Each year, to further stimulate interest in accident prevention, a contest is conducted by the Pittsburgh & Midway among its three operations, No. 18, No. 15 and the central cleaning plant, with a certificate and smorgasbord dinner the awards for the men of the winning operation. The 1950 banquet was held earlier in the year for all employees of the central cleaning plant.

F. J. Foresman, Pittsburgh & Midway personnel and safety director, presided as master of ceremonies at the banquet. Entertainment included a talk by Mr. Bray, musical selections by a Ladies' Beauty Shoppe Quartet, and travelog and sport movies.

serious as bigger and new-type machines increase stripping depths, said Merritt J. Harding, regional forester, Pennsylvania Department of Forests & Waters. The extent of the lands already disturbed and yet to be mined is inestimable. This lack of certainty, together with ignorance of the characteristics of materials that will be upturned to form new spoil banks, makes it hard to plan land uses far in advance of stripping. Mr. Harding's address was illustrated with colored slides showing the differences between early and modern stripping methods and the more complex problems created by modern stripping.

Coal will be in business for a long time, Mr. Ireland predicted at the

banquet session in the evening. R. R. Bowie, association president and president, Bowie Coal Co., presided at this meeting and Charles B. Baton, president, Greensburg-Connellsville Coal & Coke Co., was toastmaster. To back up his forecast, Mr. Ireland cited the hard-working, optimistic men who run the coal industry, the bond that unifies them against assaults from the outside and the industry's proven ability to survive upheavals and continue its growth.

Seven directors were re-elected at the noon business session, as follows: W. C. Altwater, Pittsburgh & Shawmut Coal Co.; W. B. Bannister, Pittsburgh Coal Co.; Mr. Baton; H. W. Findley, West Freedom Mining Co.;

H. D. Ford, Ford & Gaskill; A. D. Grasso, Grasso Coal Mining Co.; and A. R. Davidson, Twin River Co.

MEETINGS

- Midwest Stoker Association: annual summer outing and golf tournament, July 28, Mt. Prospect Country Club, Mt. Prospect, Ill.
- Southern Appalachian Industrial Exhibit: Aug. 16-19, Bluefield, W. Va.
- Mining Electrical Group: Exhibit, Sept. 26-28, West Frankfort, Ill.

PARIS MANUFACTURING COMPANY

Announces

THREE NEW DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

Big Bend Collieries, Inc.	1	Egan Coal Co.	1
United Electric Coal Co.	1	Southwestern Ill. Coal Co.	1
Fairview Collieries Corp.	2	Trans-Texas Coal Company	2
Colonial Coal Co.	1	Refractory Field	1
Little Sister Coal Co.	1	Harbison-Walker Refractories Co.	1
Hume-Sinclair Coal Mining Co.	1	Western Refractories Co.	1
Norwood-Tompkins Coal Co.	1	A. P. Green Fire Brick Co.	1

**THIS UNIT IS DELIVERING 6-INCH SHOT
HOLES — READY FOR LOADING
at Better Than Two Feet a Minute ! ! !**

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.



A 9-MI UNDERGROUND TRIP (left) to see the latest methods of modern coal mining at the Inland Steel Co., Wheelwright, Ky., together with inspection of surface facilities and the new preparation plant, a buffet lunch, and a talk by M. D. Cooper (left), NCA vocational training director, were features of the Third Annual High School Seniors' Day attended by 175 boys from three Eastern Kentucky counties. The program is sponsored annually by the Big Sandy-Elkhorn Coal Mining Institute to highlight the opportunities the industry offers.

School Seniors View Mining First-Hand

FOR THE THIRD CONSECUTIVE YEAR, high school senior boys from Pike, Floyd and Letcher counties, Kentucky, were recently entertained by the mining industry for a day and given the opportunity to see for themselves a modern coal mine in operation.

As the main feature of the Third Annual High School Seniors' Day, May 13, E. R. Price, general superintendent, Inland Steel Co., Wheelwright, Ky., and his assistants, took the group of 175 boys for a 9-mi underground ride, entering at the portal of the Wheelwright mine and ending up at the new portal of Price Mine No. 1, where the company has built a large washing plant.

During the trip, the boys were shown roof-bolting methods, the underground assembly yard, the mine's fully automatic signal system and the preparation and loading of coal with the latest types of machinery.

Following a tour through the new Price service center, which includes plant offices, restaurant, store, coal-testing laboratory and bath house, the boys enjoyed a buffet lunch. M. D. Cooper, educational and vocational director, National Coal Association, addressed the students briefly on the opportunities in coal mining. A visit to the new preparation plant completed the program.

The annual Seniors' Day is sponsored by the Big Sandy-Elkhorn Coal Mining Institute, with the cooperation of the Mayo State Vocational School and the Big Sandy-Elkhorn Coal Operators' Association. Its purpose "is to better acquaint boys with the coal industry, which is the back-

bone of Eastern Kentucky and, of course, the key to our economic welfare," the program prepared by the Institute explained.

In further explanation, the advance program stated: "It is not the intention of the institute or other agencies supporting the program to encourage boys to leave school to enter the mining industry, but to encourage them to finish school with mining in mind as a future career. There are many excellent opportunities for those who

prepare themselves for the better positions the industry has to offer."

Advisory Group to Study Bituminous Industry

The National Bituminous Coal Advisory Council to the Secretary of the Interior, meeting in Washington June 14, adopted a resolution calling for an investigation of some of the problems of the bituminous coal industry and the preparation of a report on a

COAL MEN ON THE JOB



SNAPPED ON THE SURFACE at the Boone County Coal Co., Sharpless, W. Va., are: W. J. Chambers (left), tipple foreman; Edward W. Greenwald, assistant general manager; R. L. Gayhart, shop foreman; M. E. Davis, electrical engineer; and Ezra Lane, shop foreman.

More "Coal-Men" Pictures appear on other pages following.

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Complete Preparation Equipment • Engineering Service

Pittsburgh Coal Inducts "Safety Champions"



HIGHLIGHTING the company's belief that "Safety and Production Go Hand-in-Hand—Not Singly," 19 new members were admitted to the Safety Champion Club of the Pittsburgh

Coal Co., Div. of Pittsburgh Consolidation Coal Co., at its eighth annual meeting and dinner dance held May 22 at a Washington, Pa., hotel.

The Club was organized in 1942 by

R. H. Nicholas, director of safety, and is composed of men who have successfully supervised a group for three consecutive years without a lost-time accident. It now has a membership of 72 men still employed by the company. Supervisors joining the club are awarded watches by the company at the annual dinner dance held in their honor. Those who already are members and continue their good record receive U. S. savings bonds.

Members of the "Class of '49" and the company officials shown in the photograph above are: Front row, left to right—Elmer Pigford; Thomas Blaskovich; J. B. Morrow, first vice president, Pittsburgh Consol; G. A. Shoemaker, president, Pittsburgh Coal; R. L. Ireland, chairman, executive committee, Pittsburgh Consol; R. H. Nicholas, director of safety; and H. C. Rose, vice president, Pittsburgh Coal. Second Row—Henry Tepke; C. C. Nicholson; Matt Cecchetti; Mike Kurimsky; John Dal Canton; John Antosh; Harry Lang; Wilson McFarlane; Benson Grant. Back row—August Kargle; John Logan; James McGowan; Fred Wardle; Paul Homce; George Cicci; William Bogatay; and Steve Dolence.

Advisory Group to Study Bituminous Industry

(Continued from page 204)

"National Bituminous Coal Policy for the United States." A committee to make the study, composed of industry representatives, was later appointed by Laurence E. Tierney, Jr., chairman of the Advisory Council, and president, Eastern Coal Corp.

The purpose and scope of the study was outlined in the preamble to the Council's resolution, which said in part: "The nation's fuel resources must be so utilized as to provide a secure and long-range supply of fuel and at the same time to insure the availability of the particular fuels immediately necessary to support the stepped-up demands of any military emergency that may arise.

"The bituminous coal industry, as steward of one of the nation's most important fuel resources, has a special responsibility in the accomplishment of that objective. Accordingly, we deem it our obligation, as an Advisory Council to the Secretary of the Interior, to undertake such studies and surveys as will enable us to recommend a National Bituminous Coal Policy for the United States that will achieve that end.

"While, within the scope of our permissible functions and competency, we will necessarily address ourselves primarily to a national policy for bituminous coal, we are of the view that the common good demands the establishment of a policy that em-

braces all sources of energy. A broad-gauged perspective must be maintained and a policy evolved that is consistent with the national interest and has due regard for all segments of industry, labor and management alike."

Stating that it expected to call on both industry and government for data and personnel, the Council said, "It is, furthermore, our intention to examine and weigh all relevant information and the views of those competent to interpret it. We intend to report the facts and to make such technical and policy recommendations as will best serve the paramount national interest.

"We are mindful of the proposals for studies of the bituminous coal and other fuel industries by various tribunals," it said. "These proposals in no wise lessen the advisability and appropriateness of having the study here proposed compiled by representatives of the bituminous coal industry and presented to the Department of the Interior. . ."

The following comprise the investigating committee: chairman, C. J. Potter, president, Rochester & Pittsburgh Coal Co.; R. E. Snoberger, president, Binkley Coal Co.; George H. Love, president, Pittsburgh Consolidation Coal Co.; Milton H. Fies, manager of coal operations, Alabama Power Co.; Paul L. Shields, president, Spring Canyon Coal Co.; L. Newton Thomas, president, Carbon Fuel Co.; Ezra Van Horn, executive vice president, Ohio Coal Association, and vice chairman of the Council; and Mr. Tierney.



Laing Made Executive of Two Pennsylvania Groups

ROBERT T. LAING, Kittanning, Pa., has been elected executive director, Central Pennsylvania Coal Producers' Association and Eastern Bituminous Coal Association, according to an announcement made June 1 by J. W. Wetter, president of both organizations. Mr. Laing was to take over his new duties July 1. His headquarters will be at Altoona, Pa. For the past 5 yr. Mr. Laing has been executive secretary and treasurer, Mineral Producers' Association. His resignation from that organization was announced June 2 at the annual meeting in Pittsburgh.



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Your Thermoid Distributor carries a complete stock to meet your requirements. Thermoid Field Representatives are available to help you select the right Thermoid Belting for your job. Broad experience in *all* fields of industry equip Thermoid Engineers to recommend the belt that can best perform the tasks you assign it in your daily operations.

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GREATER WORKER SAFETY and better safety equipment the primary objectives as . . .

MSA Dedicates Lab to Safety Progress

THE WORLD'S LARGEST RESEARCH LABORATORY devoted to the development of safety equipment for all industries was dedicated by the Mine Safety Appliances Co. in Pittsburgh, June 14. Some 400 leaders in safety and industrial hygiene and health, as well as top industrial executives, attended the exercises and inspected the new facilities, which were dedicated to the memory of John T. Ryan, international pioneer in industrial and mine safety and co-founder of MSA, who died in 1941.

Principal speaker at the ceremonies was Ned H. Dearborn, president of the National Safety Council, Chicago, who hailed the opening of the laboratory as one of the most significant advances in the history of this country's safety movement. In it, Mr. Dearborn said, we have the embodiment of a scientific purpose without reproach. It represents not only science at its best, but human purpose at its finest.

Mr. Dearborn described the laboratory as a physical plant and human organization forming a sharp, keen instrument of commerce and industry and scientific investigation, whose ultimate worth will be measured by the number of men and women who will live longer because of it.

George H. Deike, president of the company and original partner of Mr. Ryan in its founding 36 yr ago, traced the firm's history. He and Mr. Ryan had been engineers in the mine-rescue and recovery division of the U. S. Bureau of Mines shortly after the

Bureau was established at Pittsburgh in 1910. Their experience at mine fires and explosions, Mr. Deike said, led them to start a company supplying apparatus, equipment and instruments to protect lives and property.

Since 1914, the company's activities have expanded from mining into all branches of industry on a worldwide scale. Today, it is the largest manufacturer and supplier of safety equipment in the world, he said.

Facilities of the new laboratory will be used to develop equipment and devices to combat hazards of all types. Constantly changing industrial processes bring new hazards that must be overcome by new safety equipment, Mr. Deike pointed out. In addition to continuing research to improve existing safety devices and rescue apparatus, safety equipment and instruments for such relatively new fields as air pollution and atomic energy are among the projects planned for the laboratory.

Virtually every branch of science and engineering is utilized at the laboratory for developing protective equipment and instruments. It is staffed by chemists, physicists, electrical engineers and other scientists. The four-story building contains a wide variety of research instruments and equipment, including, for example, high-altitude chambers; dust, fume and gas chambers; a wind tunnel; and an electron microscope magnifying up to 100,000 times. Its library includes a comprehensive collection of data on safety, industrial health and hygiene.

New models of instruments and equipment developed through research are to be manufactured in the experimental shop on the ground floor.

Dr. William P. Yant is director of MSA research and development. He is a member of many technical societies and associations and was the first president of the American Industrial Hygiene Foundation. In 1946, Dr. Yant received the Pittsburgh Award of the American Chemical Society, for distinguished service to chemistry, and recently was appointed chairman of the steering committee of the U. S. Technical Conference on Air Pollution.

New President for Bituminous Coal Research

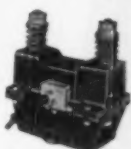
The board of directors of Bituminous Coal Research, Inc., June 7 announced the election of Dr. A. A. Potter, dean of engineering, Purdue University, as president of BCR on a part-time basis. He will continue to serve Purdue in his present capacity and now takes over the functions of R. H. Sherwood, who has served as BCR president on an interim basis since the resignation of J. B. Morrow April 7. Mr. Sherwood resumes his former post as BCR first vice president.

Dr. Potter is internationally known and his entire career has been spent in research and education in the fields of fuel and power generation. He is a past president of the ASME.

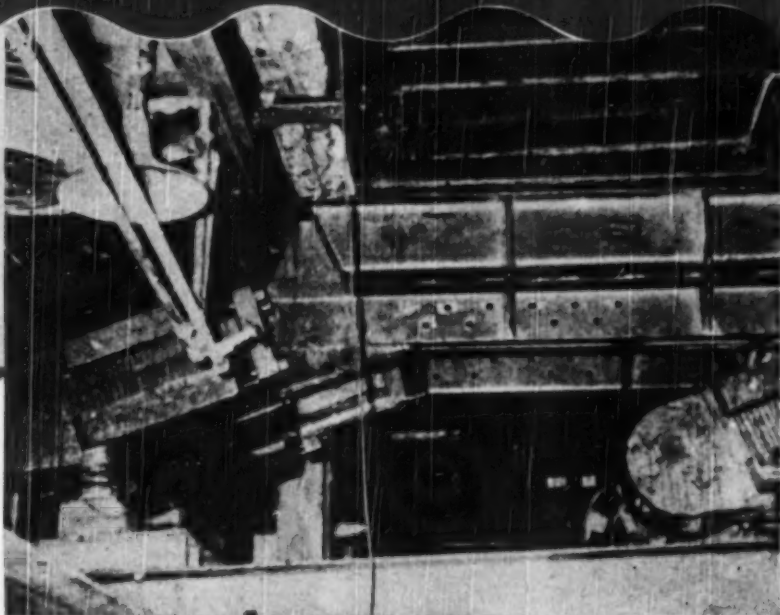
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ELECTRIC VIBRATORS
Assure a steady flow from bins, hoppers, chutes.



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Provide a coarse sizing operation—plus a controlled feeding operation.

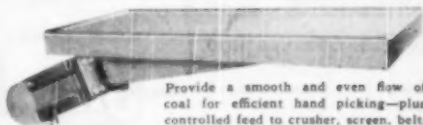


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Provide heavy tonnage sizing and feeding operations simultaneously.



"Vibrating" PICKING TABLES



Provide a smooth and even flow of coal for efficient hand picking—plus controlled feed to crusher, screen, belt, etc.

● In this instance a Synton Dual Magnet Drive Feeder with 36 inch wide x 15 feet long trough was installed to solve the problem of moving $\frac{3}{4}$ -inch XO wet coal 15 feet horizontally to a mixing drag conveyor. This method was used to overcome the difficulties of wet coal sticking to a belt conveyor.

Maintenance is held to a minimum as there are no motors, speed reducers, gears or belts requiring attention. As a result, the coal is kept moving—high production is maintained and costs are kept down.

Rate of flow is controlled by means of a wall mounting containing—operating switches—electronic valve—and dial switch. Thus, flow can be regulated to production needs—easily—quickly—accurately.

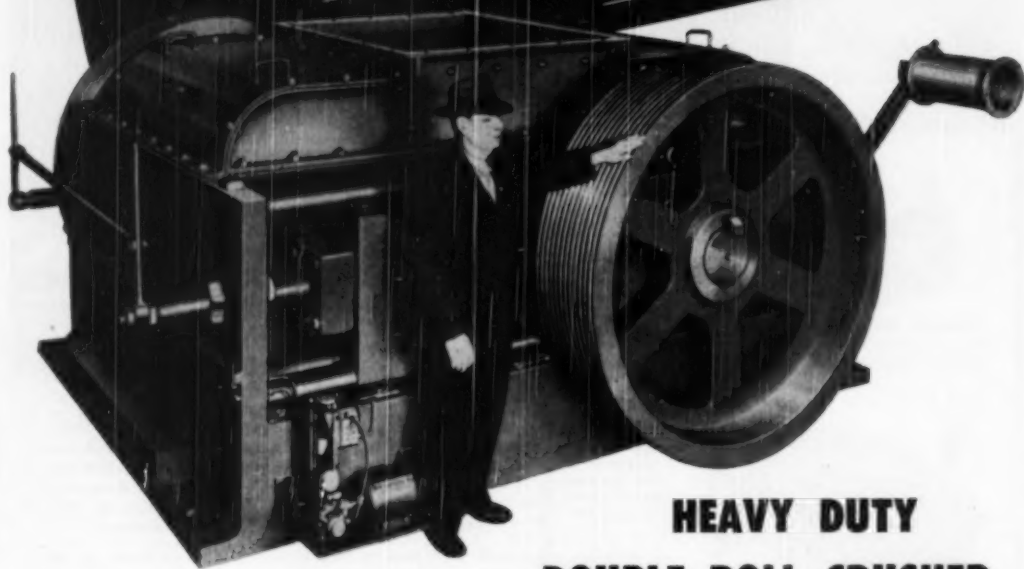
This is only one of a multitude of applications where a Synton Vibratory Feeder can help your production and operating costs.

Consult a Synton representative on your material handling problems.

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generator sets and power units • work boats and pleasure craft.



MINE INSPECTORS' OFFICERS—Publicity editor, J. H. Edwards (left), associate editor, Coal Age; president, A. D. Sisk, chief, Kentucky Department of Mines & Minerals; vice presidents, Arch J. Alexander, chief, West Virginia Department of Mines, and John M. Malloy, chief mine inspector, Oklahoma; treasurer, J. J. Rutledge, chief consultant, Maryland Bureau of Mines; secretary, C. A. McDowell, director, industrial labor relations, Coal Division, Jones & Laughlin Steel Co.; a sistant publicity editor, E. A. Farnsworth, inspector, Iowa Department of Mines; assistant editor-in-chief, J. W. Fitzjarrell, chief, Arkansas Department of Mines.

Mine Inspectors See Safety Advances

Roof Bolting, Continuous Mining and Blasting Are Top Subjects at 40th Annual Convention—Six-Man Panel on Safety Stresses Equipment, Cooperation and Education As Big Factors—Meeting Is Group's Largest

SAFETY AS REGARDS CONTINUOUS MINING, roof bolting, prevention of disasters, multiple blasting and electronic inspection of mine

ropes and an open forum on various other safety questions were highlights of the 40th annual convention of the Mine Inspectors' Institute of

America held at Huntington, W. Va., June 5, 6 and 7. A total registration of 523, of which 351 are members, made it the largest meeting in the institute's history. Okey L. Patterson, governor of West Virginia; W. W. Payne, mayor of Huntington; Arch J. Alexander, chief, Department of Mines, West Virginia; and J. J. Foster, assistant to the president, Island Creek Coal Co., welcomed the delegation at the opening session. Stephen Williams, outgoing president of the institute and chief, Division of



OPENING SESSION—W. W. Payne (left), mayor, Huntington, W. Va.; Arch J. Alexander, chief, West Virginia Department of Mines; Okey L. Patterson, governor, West Virginia; Stephen Williams, chief, Ohio Division of Mines, and retiring institute president; and J. J. Foster, assistant to the president, Island Creek Coal Co., Huntington, W. Va.



ROOF BOLTING—W. Roy Cunningham (left), Pennsylvania bituminous mine inspector; Joseph Bierer, administrative assistant, West Virginia Department of Mines; Gordon E. Smith, Pennsylvania anthracite mine inspector; C. W. Owings, mining engineer, USBM.

Mines, Ohio, presided at all sessions.

A. D. Sisk, chief, Department of Mines & Minerals, Kentucky, was elected new president of the institute. His state was selected as the meeting place for next year and it was left to the Kentucky delegation to recommend whether it be held at Louisville, or Lexington. A large group of attendants made an inspection trip through the rolling mill of the International Nickel Co., where they saw Monel, Inconel and associated alloys being refined, rolled and made into commercial shapes. At the annual dinner, with Mr. Alexander as toastmaster, the speaker was Rosey Roswell, of Pittsburgh, Pa., broadcaster of Pittsburgh Pirate games.

"There is nothing wrong with the coal industry that official Washington cannot cure—by leaving it alone," said Jesse V. Sullivan, secretary, West Virginia Coal Association, in an address, "Fifty years of coal mining in West Virginia." In that vein he continued: "Any time that coal suffers any economic distress, it is directly traceable to the errors of omission and commission in Washington." He traced the history of coal mining in West Virginia. In 1931, that state lead all others in the production of bituminous coal and has maintained that supremacy every year since. In 1949 the state produced 122,914,000 tons, equal to 28.2% of the bituminous coal produced in the United States.

"I reiterate," he concluded, "that the basic industry of West Virginia, upon which more than a million persons are dependent, will continue to lead our economic parade for the coming three centuries if the nation will give to our industry equality under the law. We seek no advantages over others, no special privileges for the industry, but insist that justice be accorded to a great industry that is the largest employer, the largest wage-payer and the largest taxpayer in West Virginia."

Acceptance of roof bolting as an aid to timbering but not as a prime factor in controlling roof was the attitude expressed by W. Roy Cunningham, state mine inspector, in his paper, "Results of Roof Bolting Investigation — Bituminous Division, Pennsylvania." He said it has been reported that roof bolting was done some thirty years ago at Pawnee near Brookville in Jefferson County, Pa.

Most of Mr. Cunningham's paper described the finding of the two commissions appointed by the Pennsylvania secretary of mines to study roof bolting, report if practicable and draw up specifications. Failures were sought out and studied. A certain failure after 16 months emphasized to the commission that there must be a test of time with each experiment. Before roof bolts can be used in Pennsylvania without accompanying timbers, the state law, which calls



GENERAL SAFETY PROBLEMS—Gerald M. Martin (left), Ohio deputy mine inspector; William Butts, director, Indiana Bureau of Mines & Mining; Walter Eadie, director, Illinois Department of Mines & Minerals; W. H. Roll, executive assistant, Kentucky Department of Mines & Minerals; J. J. Snore, production manager, Rochester & Pittsburgh Coal Co.; C. H. Snyder, president, Sunnyside Coal Co.; and P. A. Grady, Accident Prevention Commission, West Virginia Department of Mines.



OPEN FORUM ON SAFETY—William Simpson (left), Nova Scotia Department of Mines; Earl R. Maize, director, Safety Division, National Coal Association; G. W. McCaa, general superintendent, Consolidation Coal Co. (W.Va.); W. Roy Cunningham, Pennsylvania bituminous mine inspector; A. Finley Harper, chief, Division of Inspection & Safety, Alabama Department of Industrial Relations; C. R. Stahl, assistant to the vice president, Eastern Gas & Fuel Associates; and C. E. Jones, safety director, District 29, UMWA.

specifically for props or timbers, will have to be changed.

Mines that produced 38.06% of the total deep-mine production in West Virginia were experimenting with roof bolting at the close of 1949, said Joseph Bierer, administrative assistant, West Virginia Department of Mines, in a paper, "Results of Investigations with Roof-Bolting in the West Virginia Field." Many of those experiments were begun in May to July, 1949, while others did not begin until November. However, in 1949 the tons produced per roof fatality in mobile loading mines showed

an increase of 110% over 1948. Of the total production of mobile loading mines in 1949, the production from those using roof bolting amounted to 62.7%.

Advantages that have been definitely proved for roof bolting are the following: "It provides greater protection to the face worker from falls of roof and from obstructed clearance," (2) "less resistance to ventilating current is one object of installation in air courses" and (3) "a surprising increase in efficiency of working forces in face installations is reported."

(Continued on page 238.)

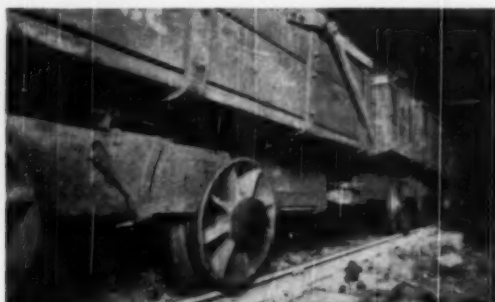
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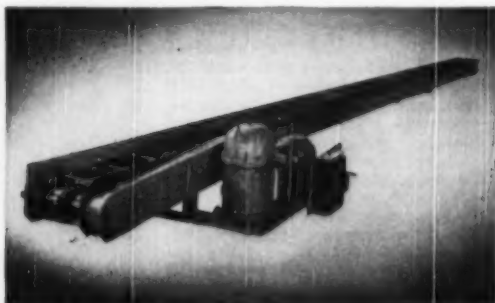
1 BEARING LUBRICATION of automatic loaders. Cities Service Trojan Grease recommendations can help prevent breakdowns, reduce excess wear, save maintenance costs.



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AT THE OPENING SESSION: Allen Garrett Jr. (left), electrician, New River Co., and president, New River and Winding Gulf Institute; M. K. Clay, maintenance supt., Gulf Mining Co.; J. O. Croo, elect. engineer, West Virginia Engineering Co.; L. W. Scott, engineer, and F. A. Leinberger, applications engineer, General Electric Co.; John C. Fox, elect. engineer, Virginian R.R.; and Harry Houtz, ventilation engineer, New River Co.



ACTIVE AT THE EVENING SESSION were: G. R. Spindler (left), director, School of Mines, West Virginia University; E. B. Ellerbe, Westinghouse Electric Corp., and chairman, W. Va. Section, AIEE; and L. D. Schmidt, chief, Synthesis Gas Production Research, USBM.

Beckley Groups Scan Mine Problems

Power Savings With Mine Fans, Conveyor Controls, AC Power Underground and Future Coal Research and Development Highlighted at Sixth Joint Meeting of AIEE W. Va. Section and New River and Winding Gulf Institute

SAVINGS OF OVER \$1,200 ANNUALLY on a fan normally requiring 50 hp and close to \$5,000 on a fan requiring 200 hp are possible by cutting air volume in half for two days a week, according to a paper on "Mine Fan Drives" presented at the sixth annual joint meeting of the West Virginia Section, AIEE and the New River and Winding Gulf Electrical & Mechanical Institute, held in Beckley, W. Va., May 11.

Conveyor controls, ac power underground and railroad electrification were subjects of three other papers at the afternoon session. After the dinner, L. D. Schmidt, chief, Synthesis Gas Production Research, USBM, and G. R. Spindler, director, School of Mines, West Virginia University, discussed "New Developments and Trends in Research." Chairmen of the sessions were Allen Garrett Jr., electrician, New River Co., and president of the local institute, and E. B. Ellerbe, Westinghouse Electric Corp., chairman of the AIEE section.

MINE FAN DRIVES—The paper on mine-fan drives and their applications was read by L. W. Scott, engineer, General Electric Co., Charleston, who prepared it jointly with H.

G. Houtz, ventilating engineer, New River Co., and F. A. Leinberger, applications engineer, General Electric Co., Charleston. In West Virginia, a permit must be obtained from the state department of mines to reduce air during idle days, and the stipulation is imposed that in a gassy mine the fan must be operated at full speed for at least 12 hr before the "fireboss run" and for at least 3 hr previously in a non-gassy mine.

If a modern axial-flow fan is operating on the highest blade position, a reduction of about 25% in air volume can be obtained by changing the pitch of the blades. Since most of these fans normally operate on intermediate blade positions, thus limiting the possible reduction, and since considerable time would be required to adjust each blade, the speed-reduction job naturally falls to the electrical equipment, the paper pointed out.

Four speed induction motors are available and in the smaller sizes and lower voltages, pole-changing switching is not costly. For large motors operating at 2,300 v or greater, pole-changing switching equipment becomes so expensive that a Ward-Leonard drive can be considered.

Two-speed synchronous motors are a possibility for large fans. In this motor, the field coils are grouped in two circuits and brought out to additional collector rings for switching poles from the conventional NSNS to NNSN. The stator also is switched in the same manner as with a multi-speed induction motor.

A third method of speed control, and one well adapted to fans, is the wound-rotor induction motor with secondary resistance. Losses in the resistance are not as great as might be expected because they lessen as the motor output decreases. Magnetic and hydraulic slip couplings were mentioned for speed control but dismissed as more expensive than the wound-rotor induction motor and its control.

In an example of possible savings outlined in the paper, the cost of a 100-hp squirrel-cage motor and controls was given as \$1,538, while that of a two-speed motor and control of the same size was \$2,275. Assuming that normal operation of the fan required the full 100 hp, the additional \$623 cost of the two-speed motor would be amortized in 4 mos with two days per week of 50%-volume operation. The entire cost of a new two-speed motor to replace an existing one-speed motor would be amortized in a year.

RAILROAD ELECTRIFICATION—The Virginian R.R. still is powered entirely from coal, John C. Fox, electrical engineer for the Virginian,

(Continued on page 262)

**loaders
are kept busy
with**

**World's
largest
line**



of permissible

For faster, more economical drilling there is a CP permissible electric drill to meet any kind of working condition. Many modern mines are breaking production records with these various types of electric-powered equipment.



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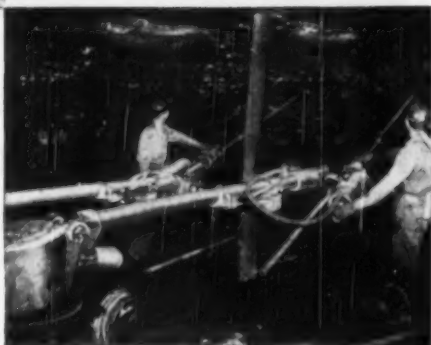


Combining extremely fast drilling with great mobility, the CP all-electric Permissible Tramdrill handles easily in narrow working places or entries, and seams as low as thirty inches.

In an Illinois mine TDD Double Arm Tramdrills are working sixteen places per shift, drilling eighteen 3 1/2" diameter, 8-foot holes per place. Averaging 250 holes per shift, they sometimes drill over 300 holes.

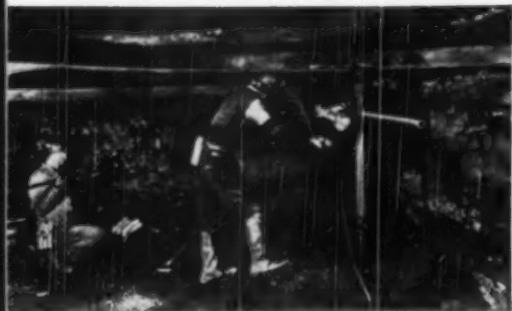
In a West Virginia mine, two DA-9 Drill Arms are drilling 3 1/4" diameter, nine-foot holes, for Cardox shooting in a coal seam ranging from seven to nine feet thick—and keeping ahead of three loaders.

CP Drill Arm units are electrically powered and controlled. To operate, it is merely necessary to move the unit to the face, swing the drill into position and turn on the power. Drill Arms can be mounted on CP Tramdrills, trucks or mine locomotives.

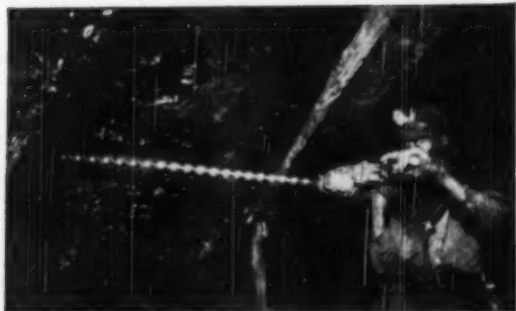


DA-9 Drill Arms mounted on mine flat car.

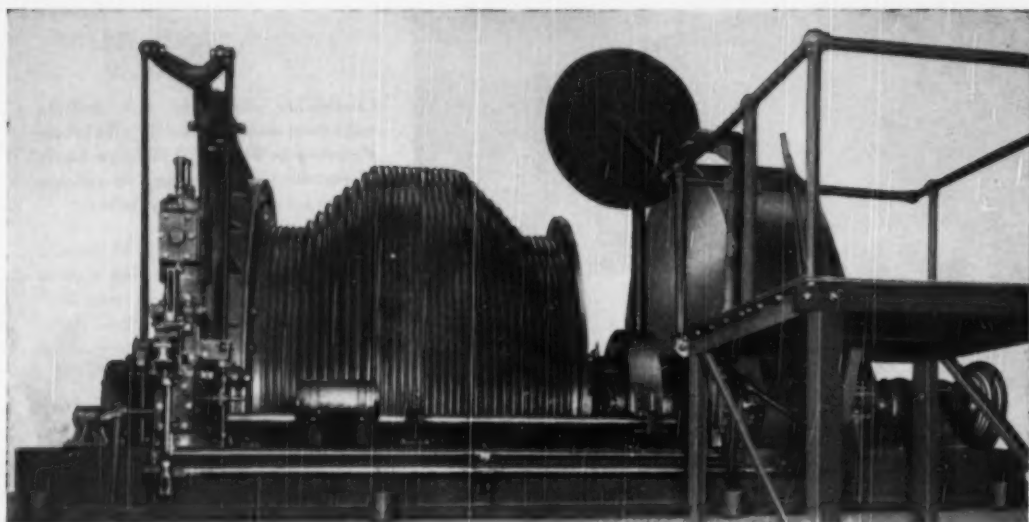
drilling units



The CP No. 574 Permissible Post-Mounted Coal Drill has a drilling speed up to 40 inches a minute and is capable of drilling 40 to 60 holes per shift.



The fast CP No. 572 Permissible Hand-Held Drill has a safety clutch for release if the auger sticks—a protective feature for operators and motor.

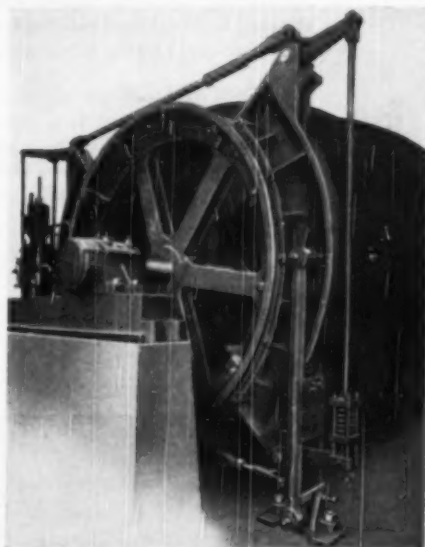


800 hp. Electric Hoist for balanced hoisting. Cast steel bi-cylindro-conical drum, built in four sections, is 9 to 12 ft. in diameter with machined grooves for $1\frac{1}{4}$ " rope. Dependable safety devices stop the hoist quickly but smoothly in event of power failure, and prevent overwinding, over-speeding, or starting in wrong direction. Post brakes on drum and auxiliary brake on pinion shaft operated by gravity-actuated air-brake engine. Single-reduction herringbone gears are completely enclosed in oil-tight welded-steel guard. Illustration shows shop assembly without motor or electrical control equipment.

For LOW-COST Hoisting in a West Virginia Coal Mine

In balanced hoisting at a well-known West Virginia coal mine the modern Vulcan Electric Hoist here illustrated and described combines high capacity with minimum power consumption. Its outstanding feature is the bi-cylindro-conical drum, cast in our own open-hearth steel foundry, which permits rapid acceleration without excessive peak load on the motor and assures minimum inertia of rotating parts during deceleration. Other features that make for fast, safe, hoisting at lowest ultimate expense are shown in the accompanying illustrations.

Your hoisting conditions may be entirely different but whatever they are Vulcan engineers can meet them with the right design—backed by experience acquired during a hundred years of continuous service to the mining industry. Correspondence regarding any present or prospective hoisting requirement is cordially invited. Illustrated bulletins on request.



Rear view showing air-operated parallel-motion post-type brake with pressure-graduating rig. The latter is an exclusive Vulcan feature which assures smoother, more uniform, graduated braking pressure than would otherwise be possible.



Vulcan Iron Works

WILKES-BARRE, PA., U.S.A.

Other Vulcan products include All-steel Sheaves, Cages and Skips, Shaking-Chute and Chain Conveyors and all types of Locomotives for underground and surface haulage. Write for illustrated bulletins.

Handiest Little Rig We've Ever Seen Around A Mine

.. Hydrocrane Users Report

Hydrocranes
handle all these

mine jobs — and then some

- Load timbers to mine cars from truck, stockpile or gondola car.
- Erect and dismantle machinery, conveyor sections, etc. at coal preparation plants.
- Stockpile and rehandle sand, cinders, gravel, slag, red dog and building materials.
- Clean up around tippie tracks.
- Clean out and move coal cars.
- Dig trenches, clean out drainage ditches, excavate for foundations.
- Clean up cave-ins.

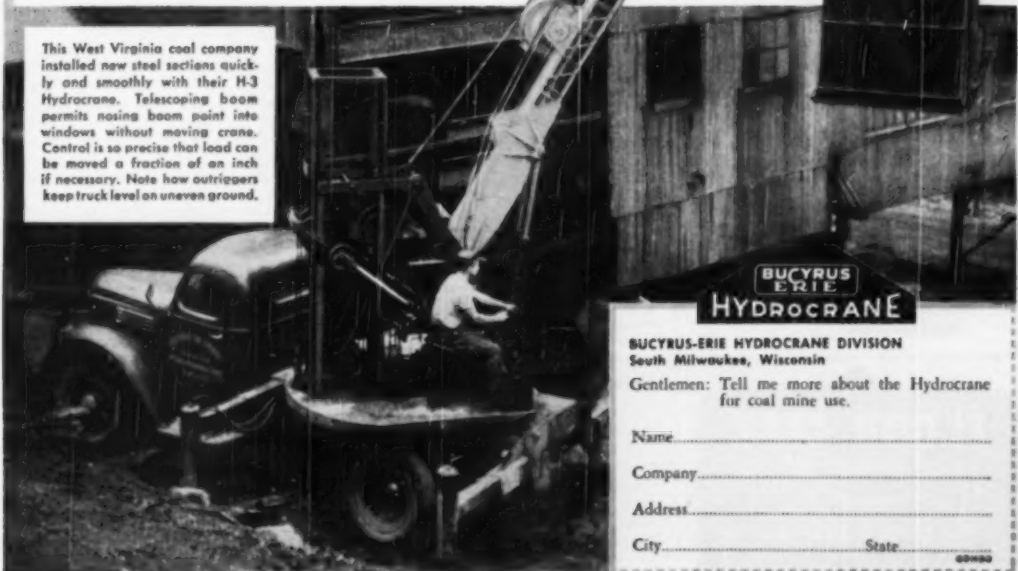
Mine operators are really sold on the all-around performance of the truck-mounted Bucyrus-Erie Hydrocrane. They report it's a big time and money saver on countless digging, lifting and material handling jobs formerly done with makeshift rigs and costly hand labor.

Every Hydrocrane work function is fully hydraulic. Control is accurate, precise — a big safety factor when working around people and in close quarters. Two Hydrocrane sizes — 2-ton $\frac{1}{4}$ yard, and 3-ton $\frac{3}{8}$ yard. Find out more about this multi-job crane. Send the coupon now.

BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

- Unload mine tracks, miscellaneous supplies, motors and machinery.
- Remove snow.
- General utility work.

This West Virginia coal company installed new steel sections quickly and smoothly with their H-3 Hydrocrane. Telescoping boom permits nosing boom point into windows without moving crane. Control is so precise that load can be moved a fraction of an inch if necessary. Note how outriggers keep truck level on uneven ground.



**BUCYRUS
ERIE
HYDROCRANE**

BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

Gentlemen: Tell me more about the Hydrocrane for coal mine use.

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Save COSTS



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Flood City Bronze Bearings and replacement parts are cast from a superior grade of hard, long-wearing bronze, and are machined by experts for perfect fit.

All standard bronze replacement parts for all types of mining equipment are carried in stock, and we are equipped to make any special bearings to fit your particular needs. Please write for estimates on your requirements.

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SPECIFY FLOOD CITY BRONZE
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Prompt deliveries can be made from complete stocks carried in both Johnstown and Charleston.

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BRASS & ELECTRIC CO.

JOHNSTOWN, PA.

BRANCH OFFICE: CHARLESTON, W. VA.

Coal and Business Activity

Coal Production		1950 to This Date	1950 Over 1949, to Date
Est. anthracite prod., week ending June 10..	862,000	19,263,000	+ 0.1%
Est. bituminous prod., week ending June 10.	10,790,000	201,587,000	-17.5%
Source: U. S. Bureau of Mines.			

Bituminous Coal Stocks (Thousands, net tons)		Consumption (Thousands, net tons)	
May 1, 1950	Days' Supply	April, 1950	March, 1950
Electric power utilities....	12,820	63	11,167
By-product coke ovens....	7,491	28	4,848
Beehive coke ovens.....	12,914
Steel and rolling mills....	695	31	8,091
Cement mills.....	684	32	7,144
Other industries.....	10,471	39	649
Railroads (Class I).....	2,302	16	392
Retail dealers.....	1,543	7	292
Total.....	37,590	31	28,054
Source: U. S. Bureau of Mines.		*Retail dealer deliveries.	

Business Activity	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, week ending June 17.....	214.1	207.4	181.9
Steel ingot operations (% of capacity).....	101.2	101.8	84.4
Electric power output (million kw-hr).....	6,012	5,845	5,373
Crude oil production (daily avg., 1,000 cars).....	5,347	5,117	4,922
Misc. and l.c.l. carloadings (daily avg., 1,000 cars).....	76	69	72
All other carloadings (daily avg., 1,000 cars).....	56	50	63
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100).....	394.4	387.9	338.4
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100).....	246.6	236.4	210.6
Prices, domestic farm products (B.L.S., Aug., 1939 = 100).....	325.5	325.5	293.7
Prices, finished steel composite (Iron Age, 1937 = 100).....	2,837.6	2,837.6	2,705.0
90 stocks, price index (Standard & Poor's Corp.).....	150.3	148.2	111.0
*Date of latest week for each series on request.			

News in Brief

Strip-Pit Fishing Contest

The Missouri Coal Operators' Association recently announced its 1950 contest for the largest fish caught in lakes formed by Missouri strip-pit operations. There are duplicate contests, one for the public and the other for coal-company employees or their families. In each, a rod or reel is to be awarded as the two top prizes for each of three classes of fish, with an outboard motor the grand prize for all entrants.

Hanna to Sell Company Stores

The Hanna Coal Co. late in May announced that it planned to close its dairy and seven company stores and offer them at auction. James Hyslop, company president, reported the decision was in line with the industry trend of doing away with "mine villages."

Truax-Traer Net Down

The Truax-Traer Coal Co. and subsidiaries have reported a net income of \$1,514,621 for the fiscal year ending April 30, equal to \$1.54 a share, compared to a total net of \$4,485,318, or \$4.55 a share, the previous fiscal year. A reduction in working time of its mines because of work stoppages and interruptions was the reason for

the decline. A. H. Truax, president, explained to stockholders. For the fourth quarter of the fiscal year, net income was \$798,447, or 81c a share, compared to \$694,981, or 70c a share, the previous year.

N. & W. Sticks to Coal

The Norfolk & Western R.R. has completed construction of the first of three streamlined passenger coal locomotives to be built in its Roanoke shops and used on its special passenger trains. In the announcement, N. & W. officials said: "They have proved themselves to be the outstanding steam locomotives in the country. In these days when one hears so much of the great power of the modern diesel locomotives, it is interesting to note that at normal passenger train operating speeds of from 40 to 60 mph, the Class J locomotive develops more tractive power than even the giant 6,000-hp diesel, a great advantage on a hilly railroad like the N. & W." Since the line began its postwar construction program early in 1948, it has completed 25 steam freight locomotives at Roanoke and plans seven more to come.

Coal Land Pays School Loans

Some 500 acres of coal land in Raleigh and Wyoming Counties, West

HUBBARD *Wedge Nut Style* Mine Roof Anchor Bolts



THE illustration at the left shows the general appearance of the new Hubbard, Wedge-Nut Style, Mine Roof Anchor Bolt. It is the second major development in this field by Hubbard Engineers, and provides a mine roof support for those users who prefer maximum head room, installation without special tools and an efficient, sturdy, simple, easy to install type of bolt.

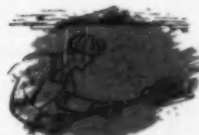
It consists of a $\frac{3}{4}$ -inch bolt, furnished in any desired length, and made with a full square head. The standard chamfering has been omitted on this bolt head in order to offer a maximum wrench hold, and eliminate the costly nuisance of sockets slipping off the head during installation.

The Wedge-Nut consists of two wedge shaped parts. On turning the bolt into the Wedge-Nut, the two parts are drawn longitudinally on each other and forced against the walls of the hole by the action of the wedge design.

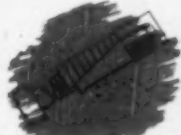
Hubbard Mine Roof Bolts are easy to install, require no special tools for installation, and leave no projections from the roof beyond the thickness of the bolt head and support plate. Write for additional details.

Maximum Head Room

Maximum Safety



Maximum Head Room—Note that the only projection below the roof of the shaft is the head of the bolt plus the thickness of the support plate used. Maximum clearance means more efficient production and greater safety.



Easy Installation—No Special Tools—Means saving in production costs. Simple Wedge-Nut design consists of only two parts, with the mine bolt itself as a third part. Nothing to get out of order—No parts to lose.



Labor-Saving—The full size square head on Hubbard Wedge-Nut style Mine Roof Bolts is formed without the usual chamfering—Corners are full, so that sockets cannot slip off with a consequent loss of valuable time.

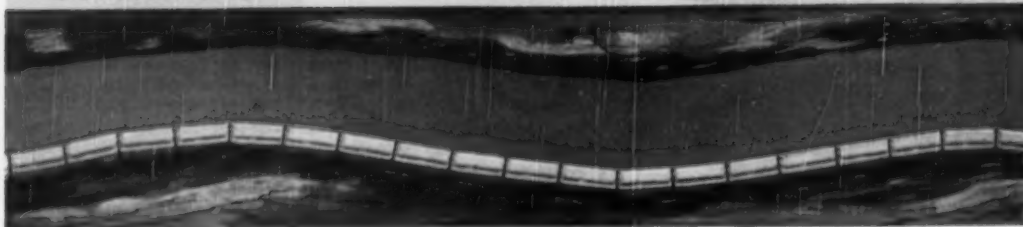
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LONG PATENTS WITH Gravity Takeup PENDING

CHAIN CONVEYORS

OPERATE MORE EFFICIENTLY—USE LESS POWER THROUGH DIPS AND OVER ROLLS AT LONGER LENGTHS



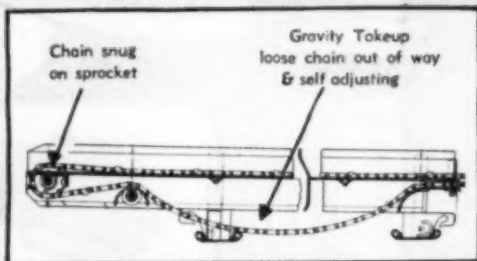
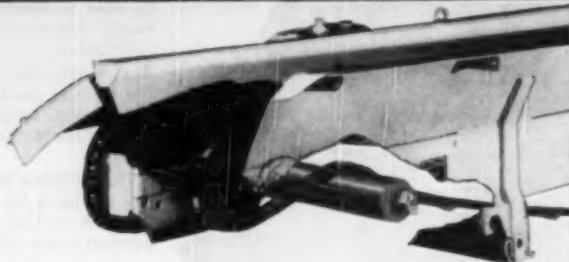
LONG Gravity Takeup is an exclusive, simple, self-adjusting method with which low tension chain operation is practical for the first time while maintaining maximum sprocket wrap at all times. Standard on all LONG conveyors, Gravity Takeup gives you these advantages:

Operation over dips and rolls: Low tension chain follows contours, does not try to pull up straight in dips. Positive, non-slip sprocket action insured by snug wrap.

Operates in longer lengths: Low tension means minimum pull for both chain and motor—permits operation of conveyors in longer lengths, making possible less frequent moves, deeper rooms.

No danger of damage to belts: Because Gravity Takeup holds the chain snug on the head sprocket, the chain cannot drag on the receiving belt—no danger of costly rips and tears.

Other exclusive standard LONG features that overcome chain conveyor problems include LONG'S stronger SUPERFLITE chain with stronger flights that stay straight and run free; LONG alloy steel pans with interlocking "Whispering Joints" that eliminate hanging; and "One Point Suspension" that insures faster "panning-up" with truer, more solid joints. These extra features, standard in all LONG conveyors, not only contribute to their reputation as the best conveyors made, but also make them your best chain conveyor buy!



You need not wait to take advantage of LONG'S exclusive extra features. Stronger SUPERFLITE Chains, "Whispering Joint" pans will readily interchange in your present chain conveyor systems. Start shifting now to LONG. You'll be glad you did.

Chain conveyors are the logical method of continuous face haulage. Only the weaknesses of old style designs have held them back. New LONG conveyors with Gravity Takeup and other outstanding features are available from 60 TPH to 300 TPH continuous rated capacities with the strongest chains ever offered for underground use. More LONG developments are coming in the near future . . . some with far-reaching effects on face costs. Write today for more information. We'll put you on our mailing list for advance bulletins, so that you can be informed of these new developments as they occur.

Long
CHAIN
CONVEYORS

LONG SUPER MINE CAR COMPANY, Inc.
FAYETTEVILLE, WEST VIRGINIA

Telephone 257

EQUIPMENT APPROVALS

Eleven approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Joy Mfg. Co.—Type TS4-IPE timber setter; one motor, 10 hp, 250 v, dc; Approval 2-726; May 1.

Hendrie & Bolthoff Co.—Type 3-hp fan-driven unit; one 3-hp motor, 440 v, ac; Approval 2-727A; May 8.

Black & Decker Mfg. Co.—Type 300 coal drill; one motor, 1 hp approximately, 250 v, dc; Approval 2-728; May 9.

Goodman Mfg. Co.—Type 665B loader; two motors, 50 hp each, 250 v, dc; Approval 2-729; May 10.

Joy Mfg. Co.—Type T4-3N truck; two motors, 4 hp each, 500 v, ac; Approval 2-730A; May 12.

Joy Mfg. Co.—Type 118U-11APHH/NN loader; two motors, 4 hp and 50 hp, 400 or 415 v, ac; Approval 2-731A; May 15.

Schramm, Inc.—Air compressor; one motor, 50 hp, 230 v, dc; Approval 2-732A; May 17.

Joy Mfg. Co.—Type WK82-T compressor; one motor, 75 hp, 500 v, ac; Approval 2-733A; May 19.

Joy Mfg. Co.—Type 4JCM-IAE/F continuous miner; two 65-hp, two 5-hp and three 7 1/2-hp motors, 250 and 500 v, dc; Approvals 2-734 and 2-734A, respectively; May 22.

Jeffrey Mfg. Co.—Type A6-AC-3 post drill; one 3-hp motor, 220 and 440 v, ac; Approvals 2-735 and 2-735A; May 24.

Jeffrey Mfg. Co.—Type 74-BR drilling machine; one 20-hp motor, 500 v, dc; Approval 2-736A; May 31.

Virginia, worth an estimated \$200,000, recently was given to West Virginia University by Fred G. Wood, a 1905 graduate and former resident of Beckley, W. Va. He specified that the land may be leased, but not sold for 50 yr, with the revenue to be used for loans to students at the university's School of Mines, with preference to students from mining families or communities. Revenues beyond the first \$50,000 may be used for research in coal development or improving community life in mining towns.

Old Timers Club Makes Awards

Harry M. Moses, president, H. C. Frick Coke Co., recently presented an Old Timers' Club engraved watch to LaVerge Hodil, chosen as the outstanding mining-engineering graduate of the University of Pittsburgh from the two classes graduating in 1950. Mr. Hodil, who graduated in February, now is employed at the Montour No. 4 mine of the Pittsburgh Coal Co.

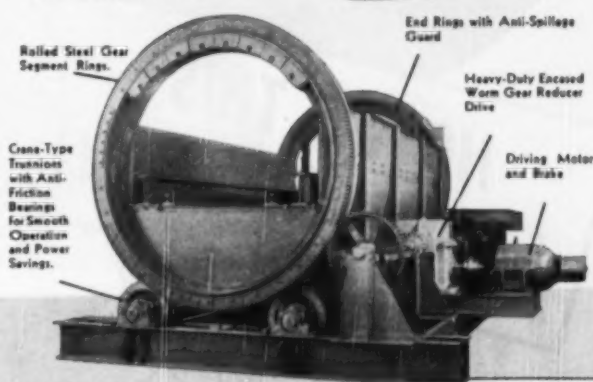
The club's award to the outstanding senior at the Missouri School of Mines

Here's the answer—
TO LOW-COST OPERATION

**CONNELLVILLE
(LEPLEY)
ROTARY MINE
CAR DUMPS**

**RUGGED
FAST
SAFE**

**WITH THESE
BUILT-IN
FEATURES...**



RUGGED . . . FAST . . . SAFE . . . these are the qualities built into **CONNELLVILLE (Lepley) Rotary Mine Car Dumps** that have enabled them to give the most economical service over long periods of time. **CONNELLVILLE (Lepley) Dumps** installed in 1927 and 1929 are still in operation and meeting the demands of modern mechanized coal handling. **CONNELLVILLE (Lepley) Rotary Mine Car Dumps** are designed with simplicity and certainty of operation prevailing, with the object of keeping maintenance and repair costs at a minimum. By either lever or pushbutton, one man controls the entire dumping operation . . . Cars are automatically powerlocked in position and held secure while discharging . . . Coupled or uncoupled cars are dumped in a 10 second operation . . . Positive gear drive on each end prevents twisting of car in frame.

The proved quality of **CONNELLVILLE (Lepley) Rotary Mine Car Dumps** is your assurance of long-term, low-cost operation.

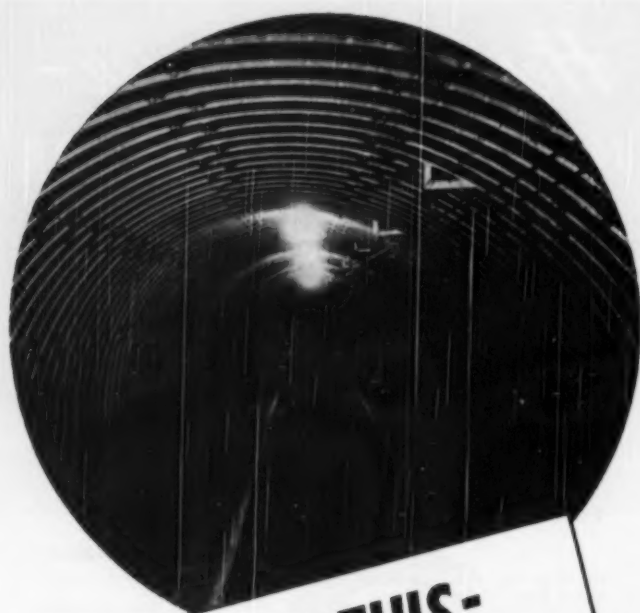
We also manufacture CAGES, HOISTS, MAULAGES, MINE FANS, SKIPS, COAL AND SLATE LARRIES, ROTARY ROCK DUMP CARS, LEPLEY HOISTING EQUIPMENT, YOUGH PUMPS, FORT PIT CAR-CAGING EQUIPMENT.

EXCLUSIVE!

EXCLUSIVE with **CONNELLVILLE (Lepley) Rotary Mine Car Dumps** are the machine - cut gear rings that mesh with the machine-cut pinions resulting in drive from both ends without play and slippage.

**CONNELLVILLE
MANUFACTURING & MINE SUPPLY CO.
CONNELLVILLE, PA.**

— SERVING THE MINING INDUSTRY SINCE 1901 —



**HOW'S THIS-
For an Effective Entry?**



More and more mining men are discovering that you can't beat Armco Liner Plates for sloped or vertical entries.

These rugged plates are designed for safe strength without excess weight or bulk. This is why Armco Liner Plates cost less to carry a given load than any other type.

It also means easier and more economical installation. One man can carry, hold and bolt an Armco Liner Section into place. Only a simple hand wrench is needed. Jobs go fast and costs are low.

Other advantages of Armco Liner Plates include fire-resistance, freedom from excessive maintenance and a wide range of sizes to meet every need.

Plan now on using Armco Liner Plates for that next mine entry, air shaft, overcast or similar job. Consider them too, for relining or strengthening existing passageways. Write us for complete information. Armco Drainage & Metal Products, Inc., 5290 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation.

Export: The Armco International Corporation

ARMCO LINER PLATES



COAL MEN ON THE JOB



PERSONNEL-DEPARTMENT STAFF of the Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., boasts of two attractive feminine members, Miss Ann Reddington (left) and Miss Mary Becker. Robert C. Brader is the creator and animator of "P&R Pete," the personnel department's familiar cartoon spokesman on such matters as safety, miner-management cooperation and coal economics.

was presented to Arduino Castrale by Paul Weir, president, Paul Weir Co., at a local AIME meeting attended by several hundred students, faculty and guests.

Lewis Accuser Quits Mines

Lloyd Sidener, the former UMWA Local president who had accused John L. Lewis of using "secret signals" during the past work stoppage, announced June 21 that he was quitting mining and was moving his family to Florida following threats against their safety. His NLRB suit for reinstatement in the UMWA was called off early in June, after he was taken back into the union and permitted to return to work. After two days on the job, however, he announced that he was not continuing as he had had threats on his life.

May Fatalities Down

The May, 1950, fatality rate for all U. S. coal mines was 0.93 per million tons in the mining of 49,514,000 tons, compared with a similar preliminary rate of 1.02 in May, 1949. For bituminous mines, the 1950 rate was 0.95, compared with a preliminary rate of 0.91 in May, 1949. The anthracite rate was 0.69, as against 2.27 first reported for May of last year.

Purchasing Agents Look To Better Coal Demand

In a recent bulletin, the National Association of Purchasing Agents



EXTREME PRESSURE

All production machinery will last longer — give better service — if the proper lubricant is used. That's why you will find it profitable to use high quality Tycol oils and greases in your plant.

There's a reason! No matter what your lubricating need — *EXTREME PRESSURE, high or low temperature, high speed or any other service condition — there's a Tycol oil or grease suited to your specific requirements.

Refined from the highest grade crudes, Tycol lubricants are exceptionally resistant to breakdown which means greater economy . . . longer machine life for every type of equipment.

Tide Water Associated will gladly recommend the Tycol lubricant that meets your particular requirements. Call, write or wire your nearest Tide Water Associated office today.



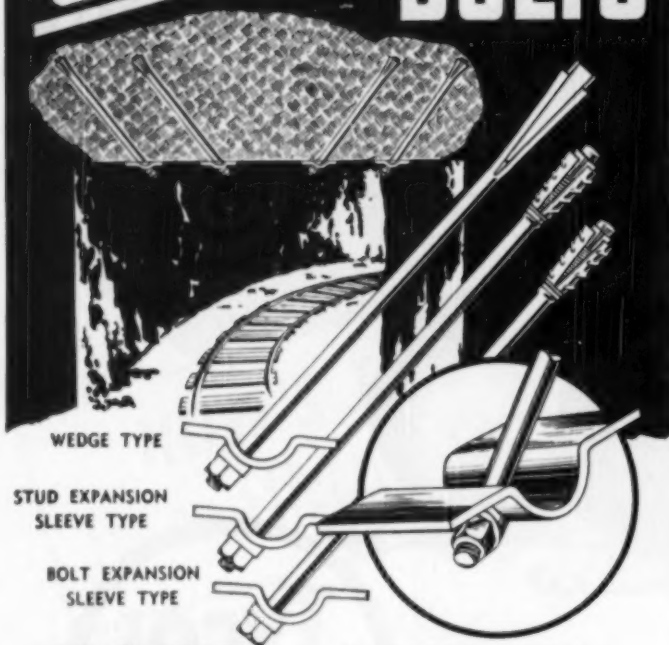
Boston • Charlotte, N. C. • Pittsburgh • Philadelphia • Chicago
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*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

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ROOF SUSPENSION BOLTS



WEDGE TYPE

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SLEEVE TYPE

BOLT EXPANSION
SLEEVE TYPE

SAFE ECONOMICAL

Increase safety and cut costs by holding your roof with West Virginia Roof Suspension Bolts. Easy to install, require no maintenance and eliminate timbering. Result is a passageway clear from wall to wall, floor to roof, providing less resistance to the flow of ventilating air, enabling loading machines to clean up a cut from rib to rib without interference from timber or timber legs. West Virginia Roof Bolts can be used singly at selected points or in sets of three or four with steel channel. Available in lengths from 2 to 8 feet, in types as illustrated. Use Nut washers for vertical installations, or West Virginia Universal Angle washers for angular installations.

The new West Virginia universal angle washer is especially designed for use with West Virginia roof suspension bolts. The washer is adaptable for installations at angles between 40° and 60°. Within these limits, no matter what the angle, the nut bears fully on the washer. West Virginia universal angle washers may be used against either crossbars or the roof itself.

Write for descriptive literature and information on application of roof bolting to your particular problem.

Manufacturers of
RAILS and ACCESSORIES
TRACK WORK
STEEL TIES

**West Virginia
Steel & Manufacturing Co.**
Huntington, West Virginia

forecast a probable output of 500,000,000 tons of coal from April 1, 1950, to March 31, 1951, and said that as a result "it does not appear that there is any immediate need for any government action to regulate the coal industry."

In discussing the tonnage estimate, the bulletin said: "If coal consumption is no greater over the period April 1, 1950, to March 31, 1951, than it was April 1, 1949, to March 31, 1950, the coal industry will have to produce 450 million tons, plus the tonnage necessary to rebuild stocks to a level which the consumer feels he should have. This additional tonnage for storage should amount to another 35 to 40 million tons, making a total of approximately 500 million tons, or 10 million tons per week production. If business stays good, coal consumption for the next year should show an increase; if posted residual oil prices stay where they are at the present, coal will recapture some of the business which it has lost to fuel oil."

Kehoe-Berge Mine Wins Anthracite Safety Trophy

The Stevens Shaft mine of the Kehoe-Berge Coal Co., Exeter, Pa., has been named as the winner of the 1949 Sentinels of Safety Trophy in the anthracite division of the National Safety Competition sponsored by the U. S. Bureau of Mines.

Winner among bituminous mines as previously reported was Reliance No. 7 mine of the Union Pacific Coal Co., which, according to the latest report, had operated for 27 mos without a lost-time accident (*Coal Age*, June, p 140).

The 1949 competition marked the 25th anniversary of the National Safety Competition, which is open to all mines and quarries in the United States. The 1949 contest had 646 operations enrolled in the six divisions. The Sentinels of Safety Trophies are awarded by the *Explosives Engineer* magazine.

Correction

Two unintentional oversights have been called to our attention in connection with the article, "A New Approach to Evaluating Preparation Results," which appeared in April *Coal Age*, pp 81-83. The editors take this opportunity of correcting them.

On p 81, the numbering of Figs 2 and 3 was switched, as indicated in the text. On p 83, in the next to the last paragraph of the middle column, the first sentence should have read: "Forecasting Results of a Cleaning Operation—The coefficient of greatest interest from an economic viewpoint is the organic efficiency; that is, the ratio of actual yield to the yield for a perfect separation delivering clean coal having the same average ash content."



Specialists on **Cutting and Drilling with Carbide Tools**

Kennametal—pioneers and world's largest manufacturers of cemented carbide mining tools offer you the benefit of one of the most complete collections of material assembled on the use of cemented carbide tools for cutting and drilling coal and rock. It is data recorded and reported by *Kennametal's experienced mining men*—the men who DEMONSTRATE and service Kennametal tools in the mine as well as sell them.

Material other than given above includes other folders, new methods of cutting and drilling, new applications for existing tools, reprints

and condensations of articles on cutting and drilling, reprints of talks given on cutting and drilling, and carbide tool performance in major coal seams.

This is material specializing on the cemented carbide phase of cutting and drilling. In the main, reported by our nation-wide staff of experienced mining men who handle over 30 completely different cemented carbide tools, available in over 400 different sizes. When you buy—consult a specialist, consult a Kennametal mining representative. For specialized information or service on cemented carbide cutting and drilling—write Kennametal Inc., Latrobe, Pa.

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Your Investment.
WE DEMONSTRATE!**

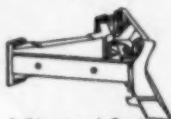
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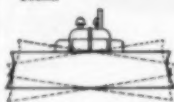


Positive Down-Pressure . . . Direct Lift

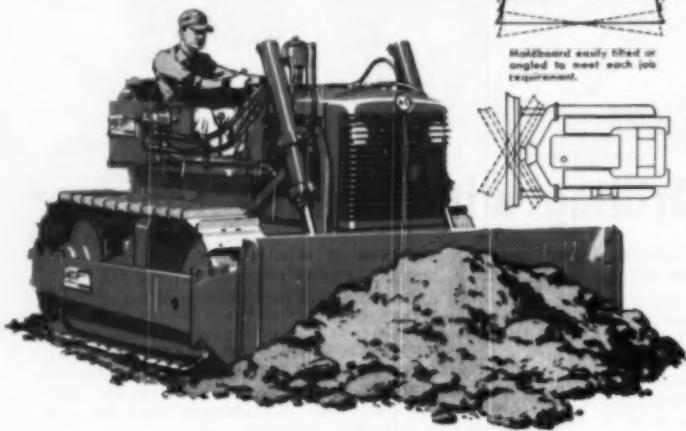
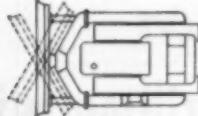
These are the twin features provided by the twin engine-mounted hydraulic cylinders in the new Baker Bulldozer and Graderbuilder designed for the HD-5 A-C Tractor. The Baker blade works "straight from the shoulder"—with hydraulic action so positive that the blade is forced down until virtually the entire weight of the tractor rests on the cutting edge. THE BAKER MANUFACTURING CO., Springfield, Ill.



Bulldozer and Graderbuilder interchangeable; just half the necessary blade to the standard post-beams.



Moldboard easily tilted or angled to meet each job requirement.



P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers

Coal's Future Good

(Continued from page 191)

fuels to live and prosper while following a sensible course of conservation in the national interest.

"While we are willing to meet the competition of domestic fuels, we are waging an intense fight against foreign oil flooding some of our natural coal markets at dumped prices," he said in pointing out that present imports of foreign oil are 70% greater than in 1946 and about 50% more than a year ago.

"If our competition is restricted to domestic fuels, we see a general expansion in the market for coal as a growing population uses more and more energy through the years. Allowing for an increase in the use of oil of about 30% in the next 15 yr and for an increase of 60% in the use of natural gas in the same period, it is altogether possible to have a market for coal of 650 million tons in the year 1965," he said.

Because they were spent by practically the entire coal industry on properties and equipment, "earnings of the industry over the past few years have permitted coal prices to be reduced some 10% in the last 18 mos in spite of the recent increase in costs resulting from the last contract with the miners' union," Mr. Love pointed out.

1950 Keystone Offers Latest Mine Capacities

A 35% change in listings of personnel and operating mines as compared with the previous edition is a feature of the 1950 edition of *Keystone Coal Buyers Manual*, issued late in June.

More than 50% of the 1950 coal production will come from new mines opened within the last 6 yr, analysis of *Keystone*, a *Coal Age* affiliate, indicates. These operations reportedly have an annual capacity of 280 million tons. In 1949 alone, the publication says, 25 new deep mines of 500-tpd capacity or over, totaling 19 million tons annual capacity, were opened or placed in development.

Containing detailed data on the personnel and operation of all mines in the United States and Canada having a daily capacity of 100 tons or more, the 1950 edition lists 1,900 coal operating companies and 2,600 individual mines, as well as detailed information on 730 coal-sales organizations. The publication also lists data on 602 cleaning plants now in operation. It contains maps of coal-producing regions, a description of seam characteristics, an index of key operating officials and other information of value to the coal purchaser. The 1950 edition is available from: *Keystone Coal Buyers' Manual*, 330 W. 42nd St., New York 18, at \$15 per copy.



The only
compressed-air-tight valves
are valves designed for
compressed air



GRINNELL-SAUNDERS DIAPHRAGM VALVES

Invented by a mine engineer to stop air leaks. A rubber diaphragm seating on metal gives positive closure, even when scale is lodged on the weir. At the same time, working parts are isolated from the air lines so that no packing glands are needed, no stem leaks are possible. That was the idea behind the Grinnell-Saunders Diaphragm Valve. As one engineer said, "When about a third of your air compressors are just pumping air out through leaks and this diaphragm valve eliminates the leaks, cutting out one-third of your air costs, why you've really got something."



Diaphragm gives leak-tight closure against grit, scale, solid matter. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum. You can't

keep scale out of compressed air lines but tests prove that Grinnell-Saunders Diaphragm Valves give perfect closure when scale up to 1/6" diameter is trapped in 1" valves and up to 1/4" solids in larger valves.

No "freezing", no clogging, because all working parts are sealed off from compressed air and moisture.

Friction loss reduced by streamlined flow in both directions. Diaphragm lifts high to give unobstructed passage. Friction coefficient remains practically constant throughout range of valve sizes.



Inexpensive maintenance without removing valve from line. Diaphragm is only part that normally wears and needs replacement. Often lasts for years since compressor and finger plate support it in all positions. Quickly, easily replaced without removing valve from line. No refacing, no disc holder, no packing glands.



Self-financing through compressed air savings. This table from "Compressed Air Data Book" shows how fast you can pay for Grinnell-Saunders Diaphragm Valves out of the compressed air savings, and, perhaps, avoid the purchase of larger compressors.

Size of opening inches	Cu. ft. wasted per month at 100 lbs. pressure based on nozzle co-efficient of .65	Cost of waste per month based on 6 cents per 1000 cu. ft.
3/8	6,671,890	\$400.31
1/4	2,920,840	175.25
1/8	740,210	44.41
1/16	182,272	10.94
1/32	45,568	2.73

Diaphragms, body and lining material to meet all conditions. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum (other materials on special order). Linings of lead, glass, natural rubber or neoprene. Diaphragm materials, natural rubber or synthetics. Write for the Grinnell-Saunders Diaphragm Valve Catalog.



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Huge *one piece* BWH Belt DESIGNED TO CUT WASTE LINES!

When BWH engineers were called on to produce a fast, power-saving, economical belt for a coal mine, this 13-ton Silver King ROTOCORD BELT was the result. It's one of the largest one piece conveyor belts ever produced. Made by the famous, exclusive BWH ROTOCURE Process of continuous vulcanization, this giant is 1576 feet long,

48 inches wide. It will haul better than 500 tons an hour on a rugged grade at the fast clip of 400 feet per minute. Maintenance worries are lessened by the absence of splices. It's another top performance by BWH . . . leaders for 71 years in the manufacture of mechanical rubber goods of dependable ruggedness for use in all industries.

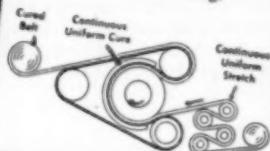
HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

BWH



DEPENDABLE RUGGEDNESS

This is the ROTOCURE Process of continuous vulcanization, exclusive with BWH. It does away with the 30 to 40-foot overlaps occurring in the duck carcass in old-fashioned flat-press curing, eliminates the possibility of operational weakness caused by such overcuring.



Another Quality Product of
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* This figure will vary with size and conditions of operation, naturally; but, regardless of circumstances, an Akins Separator in your preparation plant will give decided profit advantages.



Installed costs are low. Write for CIW Bulletin No. 49. Akins Separators are also available in complete, pre-engineered, factory-built plants of up to 300 t.p.h. capacity.

An Akins HMS Separator will do five things to lower your costs and increase your revenue:

1. Decrease hand labor
2. Recover more coal
3. Improve coal quality
4. Speed actual digging
5. Reduce operating costs

The Akins is the only separatory vessel making a three-product separation in one step: sink, float and middlings. The float coal is clean, the sink is practically worthless with an Akins, and the middlings are of burnable quality for firing your own boilers or grading your float coal to market requirements. Only three-product separation gives you these results.

Because an Akins Separator does a clean job, veins can be worked faster, getting all the coal regardless of bone, using HMS with the Akins to clean it up instead of hand labor. For a lower cost per ton, delivered, it will pay you to get an Akins Separator for three-product separation—now.

Use the
Coupon



DENVER 2, COLORADO

Ninety Years' Service to Mining
1860 — 1950

COLORADO IRON WORKS CO.

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Please send me your free Bulletin No. 49. I am interested in:

- ☐ Replacing or supplementing jig cleaning ☐ Factory-Built equipment to handle up to 300 tons per hour total feed
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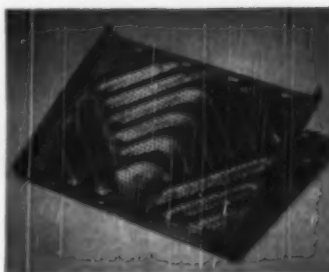
MineVent



Flexible Ventilation Tubing

The tough, mildewproof, easy-to-install, light-weight mine ventilation tubing with simple patented couplings. Available in several grades, 8" to 36" diameter. Also Non-Collapsible Mine Vent Tubing for quickly exhausting foul air. Made by makers of ABC Brattice Cloth and Mine Vent Powder Bags.

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A "must" when it comes to obtaining an efficient job! Good because the spreading and collecting riffles give uniform spread of material over the entire screen surface... turns the top and middle flow of material down in direct contact with the screen... gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

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COAL MEN ON THE JOB



ON THE JOB at the W. G. Duncan Coal Co., Greenville, Ky.: Bill Mitchell (left), storekeeper; C. M. Pomeroy, technical representative, E. I. duPont de Nemours Co.; Marion Finley, strip superintendent; John Hunt, master mechanic; Bill Husk, chief engineer; John T. Reynolds, strip engineer; and Natie Allen, tipple superintendent.

Association Activities

Arkansas-Oklahoma Coal Operators' Association, Ft. Smith, Ark., recently announced election of officers for 1950-51 as follows: president, Degen Boyd, vice president Boyd-Excelsior Fuel Co.; vice president, C. R. Cameron, general superintendent of coal mines, Lone Star Steel Co.; and secretary-treasurer, George Reeves, president, Reeves Coal Co. Elected directors of the association were: George Colville, general manager, Jewel Mining Co.; A. J. Mitchell, secretary-treasurer, New Shockley Mining Co.; W. C. Roberts, general manager, Ruby Glow Mining Co.; H. J. Collier, secretary-treasurer, Collier-Dunlap Coal Co.; John A. McCurry, general superintendent, Bernice Anthracite Coal Co.; Isaac Lewis, president, Quality Excelsior Coal Co.; Fred A. Steckleberg, president, Atlas Coal Corp.; E. S. Stephens, president, Cameron Coal Co.; and W. T. Graham, president, Keener Coal Corp.

AIME has appointed John V. Beall eastern secretary of the institute's Mining Branch. Mr. Beall will continue as editor of *Mining Engineering* magazine, with headquarters in New York.

Bituminous Coal Institute, Washington, D. C., has announced the appointment of H. B. Brown, Jr., to its public relations staff, succeeding Howard J. Carswell, who has resigned to join the public relations department of the Guaranty Trust Co., New York. An experienced writer and publicist, Mr. Brown was educated at the University of Pittsburgh and the University of Colorado. A native of Connellsville, Pa., he is grandson of the late P. J. Tormay, who was an operating official with the H. C. Frick Coke Co.

and later had coal operations of his own in Fayette County, Pennsylvania.

Southern Coal Producers' Association, at its 33rd annual meeting in Washington, D. C., re-elected its officers as follows: Joseph E. Moody, president; Walter A. Thurmond, secretary; and Laurence E. Tierney Jr., treasurer. Members of a new executive committee elected by the board of directors included: M. L. Garvey, Pocahontas Fuel Co.; L. Ebersole Gaines, The New River Co.; Raymond Salvati, Island Creek Coal Co.; and Frank Medaris, Harveyton Coal Co. Re-elected to the finance committee were Messrs. Tierney and Medaris and Frank Hornickel, Anchor Coal Co.

Stoker Manufacturers' Association, at its 33rd annual meeting in Chicago June 15, elected the following officers: president, C. T. Burg, president Iron Fireman Corp.; vice president, L. C. Dubs, president and general manager, Canton Stoker Corp.; and secretary-treasurer, T. A. Crawford, general manager, Timken-Silent Automatic Div., Timken-Detroit Axle Co. Marc G. Bluth was re-appointed executive secretary. Directors elected, in addition to the officers, were: B. O. Fink, president, Auburn Foundry, Inc.; George W. Graham, president, Eddy Stoker Corp.; Frank Hoke, president, Holcomb & Hoke Mfg. Co.; J. M. McClintock, manager, Stoker Div., Illinois Iron & Bolt Co.; C. P. Meredith, executive vice president, Steel Products Engineering Co.; and Claude A. Potts, vice president, U. S. Machine Corp.

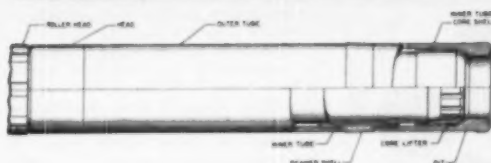
American Retail Coal Association has elected as president, Paul E. Conrad, president, Merchants Ice & Fuel Co., St. Louis. He succeeds J. Atlee Schafer, of Cleveland, who has retired after 3 yr in office.

YOU'RE
YEARS AHEAD
WITH
SPRAGUE and HENWOOD
CORE DRILLING and
EQUIPMENT

In this Year of Progress your aim is the "best" and in Sprague & Henwood Core Drilling equipment you are certainly years ahead; for here is the modern, economical answer to your coal drilling problems.

We offer you the latest in Diamond Core Drilling Machines . . . "Trucon" Bortz Diamond Bits . . . Diamond Core Drill Accessories . . . and Sampling Devices.

Stay years ahead with our products.



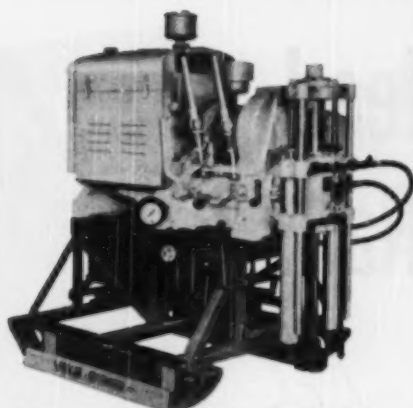
SERIES "M"

DOUBLE TUBE CORE BARREL

This differs from the ordinary swivel or ball bearing type in that the inner tube is equipped with a shell or case which extends down as close as possible to the face of the bit and the core lifter is located in this case, or shell. This reduces tendency to block as is often the case in ordinary type of core barrel where the inner tube terminates above the core lifter located in the bit. With this you get increased core recovery, particularly in soft or broken stratas.

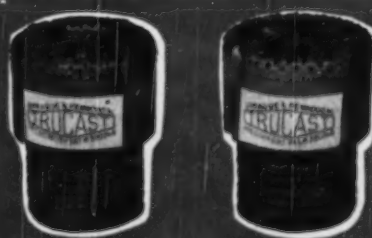
CORE DRILLING BY CONTRACT

In addition to being Manufacturers Sprague & Henwood, Inc. also is prepared to undertake Core Drilling by Contract. This includes test boring or mineral prospecting and also foundation exploration for dams, bridges, buildings, etc. Drilling grout holes and grouting is also performed on a contract basis. Thoroughly experienced supervisors and operators are readily available for your contract drilling operations. We invite your full inquiry on any of our products or services.



**NO. 40-C CORE DRILL MACHINE—
FOR DEPENDABLE SERVICE**

A modern drilling machine in every sense of the word . . . built to meet the needs of today and demands of tomorrow. It is exceptionally sturdy . . . four distinct swivel heads available for this machine . . . operated by Gasoline or Diesel engine, Air Motor or Electric Motor. Really a "must."



BORTZ DIAMOND BITS

In making these bits, the Bortz diamonds are placed in a mold and the molten metal poured on, and then . . . a process that insures a uniformity of contour and gauge. As you know, this factor is very desirable on the part of the user as it permits one bit to follow another with a minimum of reaming necessary. "Trucon" Bits are extremely tough and wear-resistant, have been used for years.

**SPRAGUE
AND
HENWOOD, Inc.**

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BRANCH OFFICES

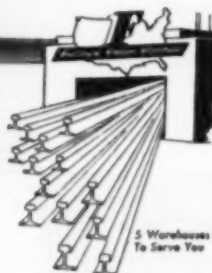
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Senate Oil Hearings

(Continued from page 191)

scattered. Coal mines cannot be kept in storage.

"The immediate effect on the coal market of this dumping of foreign oil has been to replace coal that moves to the Eastern Seaboard, particularly from West Virginia and Pennsylvania," Mr. Gaines explained. "Of the 21 million tons ordinarily used by the so-called New England states, 8 million tons have been replaced by oil."

As much as 25 million tons of bituminous coal markets may be displaced within a year, Walter R. Thurmond, secretary, Southern Coal Producers' Association, told the group. This will mean the idling of 20 to 25 thousand miners with a loss of \$75 million in wages, the unemployment of thousands of railroad workers and injury of many businesses in mining areas, he maintained. B. E. Urhelm, executive secretary, American Retail Coal Association, said that a shortage of retail coal may develop, since oil is replacing markets for slack and such markets must be guaranteed if producing companies are to economically justify the output of screened sizes for domestic use.

"Coal is an indispensable commodity in maintaining our industrial supremacy," Jesse V. Sullivan, secretary of the West Virginia Coal Association, said. "It has been a major factor in winning two great world wars. It has never requested a subsidy to maintain a sufficient production to overcome those who threaten our national existence, and an adequate supply of this fuel should not be threatened here by the dumping of foreign oil."

In outlining the effects of imports on his company's markets, Joseph T. Berta, president, Pennsylvania Coal & Coke Co., also said: "I recognize that in refining crude oil there must be the left-over of heavy residual fuel. That has been competitive for a long time, as produced domestically, but what I can't understand is why this country imports that residual fuel from gasoline refining outside of this country." Other witnesses maintained that the profit realized on higher prices for gasoline and other refined products enables oil importers to dump residual oil at whatever price is necessary to lure normal users of coal.

Prices of residual oils are adjusted to compete with other fuels and such considerations are reflected in charges made for other petroleum products, M. J. Rathbone, a director of the Standard Oil Co. (N. J.), admitted in presenting the oil importers' side of the picture. Russell Brown, general counsel, Independent Petroleum Association of America, disputed a large part of Mr. Rathbone's testimony that imports were not responsible for the present situation. Residual fuel imports are controlled almost entirely by two concerns, the Standard Oil Co. of New Jersey and the Dutch-Shell group, Mr. Brown said. "It should

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also be a matter of grave public concern as to whether an increased share of our fuel and power requirements along the Atlantic Seaboard should be left under the control of just two companies, only one of which is an American concern. No permanent price benefits to consumers can be expected if only two companies dominate the market," he emphasized.

Hearings on the subject also were conducted by a House subcommittee during the month, and many of those appearing before the Senate subcommittee, as well as other industry leaders, testified before the House group.

New Developments

Acquisition by the Truax-Traer Coal Co. of the Binkley Coal Co. and the Pyramid Coal Co., under an arrangement providing for a cash payment above an exchange of stock, was announced late last month. Truax-Traer is to issue 118,400 shares of common stock at \$12.50 a share in exchange for 3,700 shares of Binkley common. It is to pay \$366,000 cash for the 915 shares of Binkley remaining outstanding and \$385,750 cash for all the 7,715 shares of Pyramid common.

The Lehigh Navigation Coal Co., Lansford, Pa., announced last month that it would construct a \$500,000 cleaning plant addition at its Coaldale No. 8 colliery. Citing a growing demand for the high quality industrial fuel, the company said the plant would enable it to do a more efficient job of cleaning and sizing Nos. 4 and 5 buckwheat and recover a larger daily tonnage of fine sizes. The plant will have two 6-ft hydrotators, a hydrotator-classifier, three concentrator tables, a bank of flotation cells and a new 50-ft classification tank. The plant also will prepare high quality products from present silt banks, it was said.

The Acosta mine of the Pittsburgh Consolidation Coal Co., Acosta, Pa., has been leased by Hiram Swank's Sons Co., Johnstown, Pa.

The Jamison Coal & Coke Co., Greensburg, Pa., reportedly is planning to start development sometime this year of a new large-scale slope operation, in the Fairmont district of West Virginia. The property will be on the Monongahela R. R., near Fairview, and construction of the railroad extension is under way.

Formation of the Baukol-Noonan, Inc., Noonan, N. D., by a group of six North Dakota business men to take over the Baukol-Noonan Lignite, Inc., recently was announced. The property, a stripping that has operated continuously since 1930, has reserves of over 10,000,000 tons. R. E. Schaeffer is president of the new million-dollar firm and L. L. Munson, a founder of the original company, is vice president and general manager.

**would YOU
build an automobile
on a mountainside?**

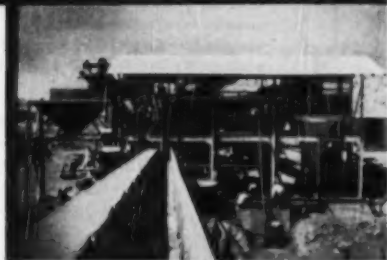


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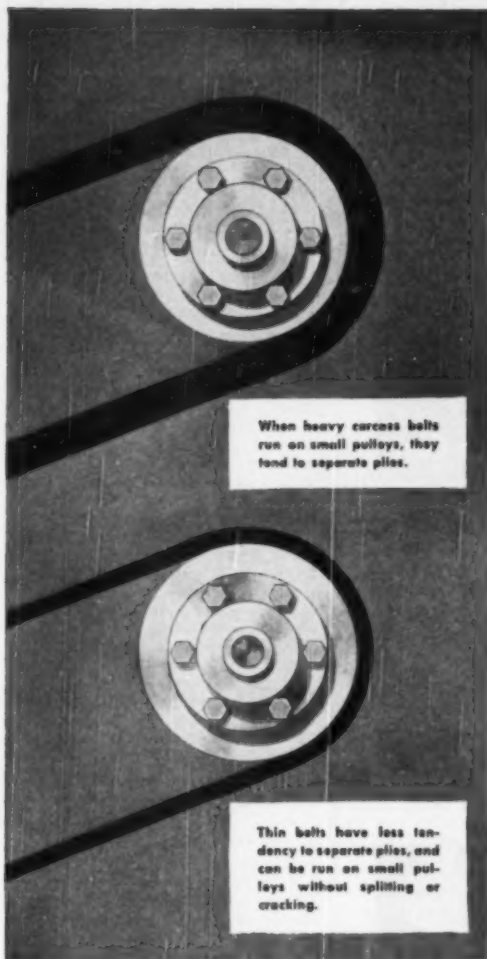
Mine Inspectors Institute

(Continued from page 213)

The situation regarding roof bolting in the anthracite region of Pennsylvania, as reported by Gordon E. Smith, state mine inspector, is summed up in the following directive issued Feb. 27, 1950, by Richard Maize, secretary of mines, Pennsylvania: "You are advised that in order to provide for the workmen a reasonably safe place in which to work, it is necessary above all that the conventional timberings be continued. Should you choose to use bolts in connection with adequate timber, neither this department nor the inspectors will offer any objections thereto."

That directive, Mr. Smith said, reflects the opinion embodied in reports of two committees, each composed of three anthracite mine inspectors, who investigated bolting in that field. Mr. Smith's paper described the various difficult natural conditions which in the anthracite field calls for the continuance of conventional timbering. The paper emphasized that while the department does not stand in the way of progress it does "oppose any ill-advised experiments which might subject one human life to the dread menace of roof falls or any other mining hazard that can be foreseen."

Most dry collectors for catching dust from drilling for roof bolts are in the experimental stage but hold great promise although rather bulky, said C. W. Owings, mining engineer, U. S. Bureau of Mines, presenting a paper, "Hazards to Health from Dust



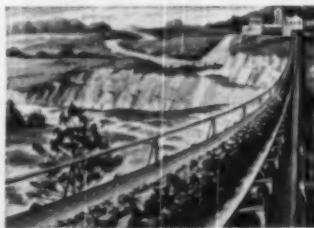
When heavy carcass belts run on small pulleys, they tend to separate plies.

Thin belts have less tendency to separate plies, and can be run on small pulleys without splitting or cracking.

MORE FLEXIBILITY. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. In addition, they trough well under any loading conditions.



GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional simply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



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HEAVIER LOADING CAPACITY is possible on conveyor belts built with Du Pont "Cordura" High Tenacity Rayon. This yarn is inherently stronger than the natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

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Before you buy your next conveyor belt, be sure to consider the new belts built on Du Pont Cordura® High Tenacity Rayon. Belts sinewed with "Cordura" offer you many operating advantages . . . yet cost no more.

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in Connection With Drilling for Roof Bolting." Water, the successful method with percussion drills, is not as effective in vertical drilling as in horizontal and moreover in some shale roofs the water causes disintegration, which makes bolts fail to hold. When using water, the operator should turn it on immediately instead of waiting until the drill has penetrated about 6 in, which is the tendency because of water splashing out. It is thought that dust is coarser with rotary than with percussion drilling.

Roof shales in Pennsylvania contain about 22% free silica. Visible amount of dust is not always a measure of harmful dust. Miners in South Wales working in coal dust containing as little as 2% free silica contracted pneumoconiosis. While it usually takes 5 to 20 yr to develop silicosis, there is a record of some men developing it in 9 to 24 months when using a certain polishing powder. X-rays do not always divulge silicosis—it may take physical examinations such as measuring lung volume. Generally men do not die from uncomplicated silicosis but from related respiratory infections. Mr. Owings' paper included much information on the effects of breathing dusts of various types and particle size.

In discussion, Earl R. Maize, safety director, Safety Division, National Coal Association, said the danger from silicosis is not as great as many people make out. From the reports of examinations at a certain mine, it might appear that 25% of the miners had silicosis. Instead, it was 25% of a particular group examined.

"Why We Had No Major Disasters in 1949" was answered by papers presented by representatives of the mining departments of Ohio, Indiana, Illinois and Kentucky. For Ohio, Gerald M. Martin, deputy inspector, said training is the keynote and he summed up the situation as follows: (1) training courses have brought clear thinking and dispersed the fatalistic ideas of some miners, (2) miners have changed their attitude and are cooperating in the safety program, (3) inspection has improved and (4) there is an improved relationship among the safety committee, operators, mine inspectors and safety engineers.

For Indiana, William Butts, director, Bureau of Mines & Mining, placed the credit as follows: (1) whole-hearted cooperation of management, labor, insurance companies and the federal and state bureaus, (2) improved ventilation, (3) closer inspection, (4) allaying dust with water, (5) rock dusting, (6) and safer blasting (the law requires off-shift blasting and much of the coal is broken down with Airdox on shift). In 1949, the Indiana law was changed to include small mines and the inspection force was increased 50%.

(Continued on page 246.)

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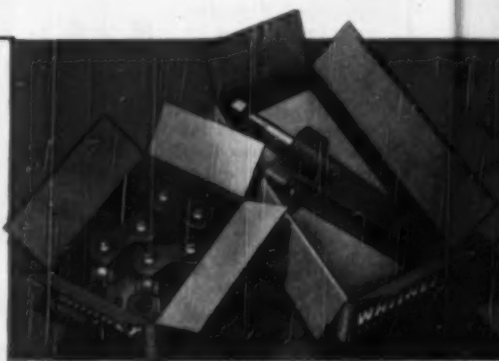
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 This monstrous power-shovel bucket
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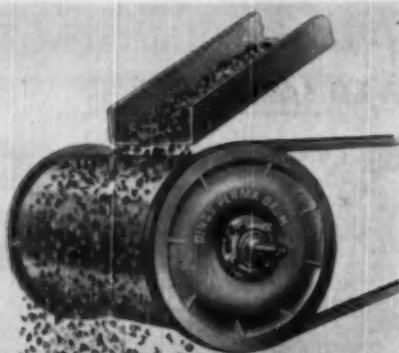
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For Illinois, constant educational programs and encouragement of safe working practices within the industry were given first places by Walter Eadio, director, Department of Mines & Minerals. Other factors he mentioned were: (1) recent beneficial changes in the mining law, (2) mine inspectors' appointments based on examination ratings, (3) service of the state analytical laboratory, and (4) management becoming especially efficient in rock dusting and ventilation.

W. H. Roll, executive assistant, Kentucky Department of Mines & Minerals, took a different approach. He had sent questionnaires to a number of men prominent in safety work in the state. A summary of his analysis of the direct reasons and contributing factors is briefed as follows:

Reason for Improvement	No. of Replies
Employee training and education	20
Better dust control	11
Better supervision due to training classes	10
Better ventilation	9
Increase in state mine inspectors	5
Better maintenance of mechanical and electrical equipment	4
Better blasting practices, more permissible and less black powder	4
First-aid training	4
Federal inspections and enforcement of the Safety Code	3
More mechanization	3
Coal operators more safety-minded	2
Pre-shift examinations and more firebosses	2
Better fire-fighting equipment. Safety in mining tied in with general improvement in mining	1
Compliance with no-smoking rule	1
Early detection of unsafe conditions	1
Better housekeeping	1
More general use of closed lamps	1

Ventilation, handling-and-haulage, roof-control and dust-control problems with the new machines which are mining and loading without blasting were discussed by two speakers. J. J. Snure, production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa., presented a paper on the problems that have been encountered in using continuous miners in four seams. His conclusions sum up the present status: "The coal mines will eventually have a practical and successful system of continuous mining. However, many of us failed to take into consideration the growing pains which all new equipment must go through. We thought we could walk before we could creep. Because of the

In severe desanding and dewatering service

U-S-S STAINLESS STEEL SAVES 40% ON SCREEN COSTS

**HERE ARE THE
FIGURES**

Type of material	Average hours service	Increased cost per screen-hour over Stainless
U-S-S 18-8 Stainless	8291
Material A	3647	40%
Material B	700	1000%

IN a series of service tests on the bottom decks of refuse shakers at the Hudson Coal Company, Scranton, Pa., U-S-S Stainless Steel proved conclusively that it costs less than other screen materials because it stands up longer.

Tests involved 14 and 16 gage 36" x 72" screens with $\frac{3}{32}$ " round holes. The best record for a material other than Stainless was 3647 hours. But Stainless Steel was in service 8291 hours, more than twice as long.

This meant a saving in hourly screen cost of 40%. What's more, the U-S-S 18-8 screens were still serviceable at the end of the test.

These figures show clearly how the longer service that U-S-S Stainless Steel gives far offsets its somewhat higher first cost.

Hudson tested these materials under the most severe service conditions—removing acidulous water and sand mixed with the refuse.

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COAL MEN ON THE JOB



GEORGE DURALL (left), tippie foreman; and Natie Allen, tippie superintendent, W. G. Duncan Coal Co., Greenville, Ky.

high concentration of a single machine in a single place, we failed to give enough importance to the retaining of crews and bosses, the serious problems of haulage, roof control, dust control, ventilation and maintenance. Fortunately, we now have our feet on the ground. We now know what is needed and a successful solution to all these problems can be worked out more promptly with proper cooperation between the operator and manufacturer."

Mr. Snure's paper went into detail on the troubles encountered. As to ventilation, he said there are mines that liberate gas so fast that the principle of continuous mining cannot be used on development. Driving 70 ft per 6-hour shift with 12,000 cfm of air circulated over the head of the machine, detector tests showed 1.6% methane. As regards haulage, it still is unsolved and until it is solved there will be no continuous mining.

Unless by some means spillage at the face, at the rear of the miners and at the rear of the surge bin car is cleaned up, there is 6 to 12 in of fine coal left in each place. The manufacturer has reported an improved type of gathering head to take care of the face spillage. Low-type high-capacity surge bins and conveyors are under consideration or are being experimented with. "Until one of these transportation systems is really proven, continuous mining is only a name."

"Where roof is bad," continued Mr. Snure, "it is still bad when using a continuous miner." Several types of roof control have been tried without finding a solution. If the conveyor haulage becomes a reality it may be possible to set substantial roof jacks under bars at the face, then replace



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3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

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with pin timbering or permanent posts when the machine advances.

Improved fog sprays operating at 200 to 600 psi and applying 11 gpm, use of approximately 10,000 to 15,000 cfm of air and additional sprays behind the line curtain are ways of controlling dust. If the air current is not sufficient, more water must be applied and that means trouble in preparation. Seven and one-half gpm will add 1% moisture to the coal and reduce the heating value by 140 Btu.

C. H. Snyder, president, Sunnyside Coal Co., talked on related problems with the Colmol. He described two new Colmols, the low model and an intermediate model, both of which will be in the field within the next 90 days. With Colmols, the rate of face advance is 15 to 24 in per minute and the floor is left clean and uniform. He stated that because of the small amount of milling action and large amount of chipping action, the Colmols, "don't produce a great quantity of dust." Twenty-four sprays delivering a total of 10 gpm or about 3 gal per ton do a satisfactory job on the dust. With this machine, the dust is well confined in the gear cases.

He described satisfactory methods of ventilation for ordinary conditions but said there are conditions where the fast advance of the machine releases gas too fast for removal, requiring shifting the machine to another working place to allow time for getting rid of the gas. As to transportation, Mr. Snyder said, "We believe we have the answer and will have the first prototype unit available for testing within 45 days."

The Colmol is favorable to roof control because the top is left smooth, arches are left at the ribs, the operator is 20 ft back from the face and the machine itself is strong enough to be undamaged by any ordinary roof fall. He stated that the machine has ability to "walk into a roof fall of big and hard material (even the softer sandrock) and reduce it to an 8-in top size or less—loading it out at the rate of 5 to 10 tpm, leaving the floor as clean as the proverbial hound's tooth."

Multiple blasting over a 5-yr period in West Virginia is charged with only 6% of the blasting fatalities and with no fatalities from roof falls, compared to single blasting being charged with 94% of the blasting fatalities and numerous roof fatalities connected with blasting. Those statistics were presented in a paper, "Advantages and Disadvantages of Multiple Blasting in Bituminous Coal Mines," by Patrick A. Grady, member, Accident Prevention Commission, West Virginia Department of Mines. Special permits for multiple blasting have been issued in the state since 1938. In 1949, multiple blasting produced 58.2% of the coal and single blasting 41.8%.

Some of the reasons given for this greatly improved record with multi-

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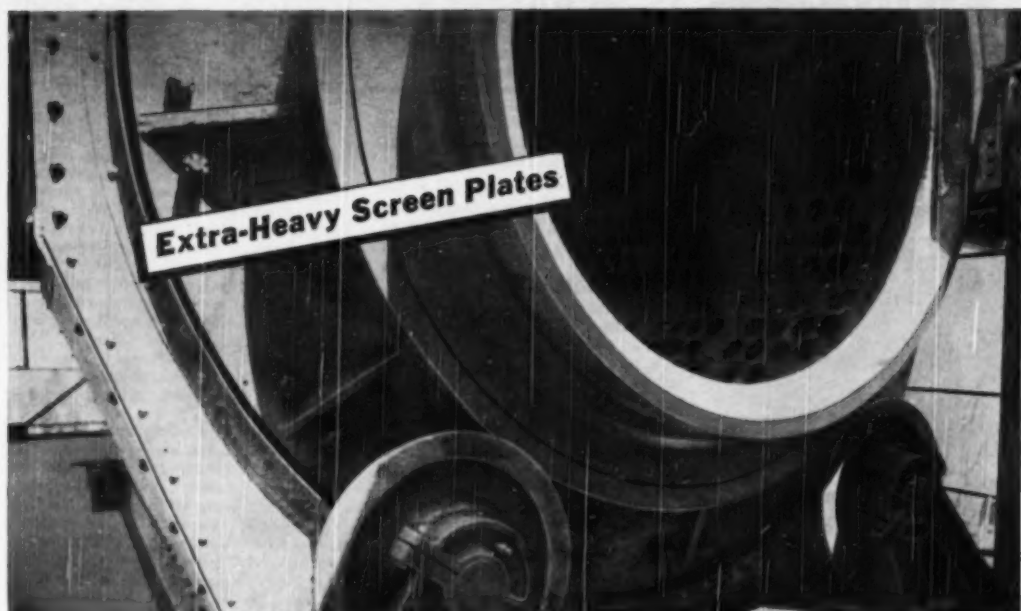
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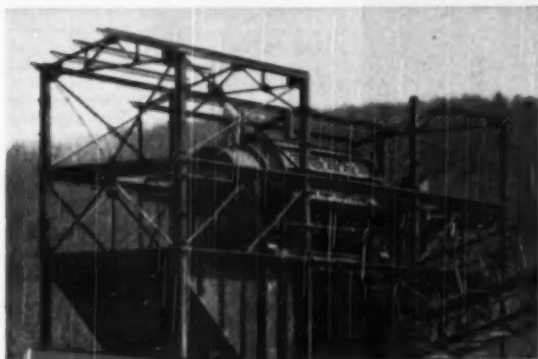
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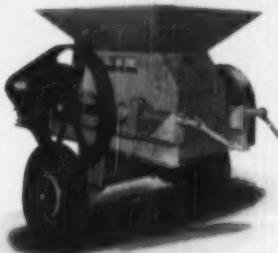
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ple blasting are as follows: (1) reduction in number of trips back to the face, thus lessening exposure to roof-fall hazard, (2) no fissures to cause windy shots, (3) blasting placed on a higher plane that demands thought and planning and precludes haphazardness, (4) easier compliance with rules in low-coal conveyor mines, where repeated trips to the face become a hardship, (5) less tendency, in the interest of saving time, to return to the face too soon after a shot and (6) use of lighter charges per hole. At the conclusion of his paper, Mr. Grady said that inspectors have canceled some multiple-blasting permits when they found that the requirements of the permits have been violated.

An electronic rope tester built into a truck owned by the Department of Mines, Province of Nova Scotia, was described in a paper, "Electronic Inspection of Mine Ropes," presented by William Simpson, inspector of mechanical equipment for that department.

A concluding paragraph of his paper sums up the accomplishment: "It has been shown that it is now possible without interrupting normal operations and without damaging the rope to obtain charts with the special cyclograph and running dynamometer which will give a measure of the stresses in the rope, also the safety factor at all points throughout its length from a study of such charts over a period of time."

To test a rope, the truck is parked at the mine and connected to 110-v power. The running dynamometer, connected to the truck by selsyn control, is taken out of the truck and placed on the rope. Also a split coil form is placed over the rope and a special self-shielding winding is wound thereon, this latter requiring about 15 min. A very sensitive stable oscillator supplies the high frequency for the magnetic field which penetrates the rope. Graphic meters simultaneously record dynamometer deflection (load on rope) and the magnetic reaction (stress and condition of the rope). Mr. Simpson's paper went into considerable detail in describing the testing equipment.

Improvements needed to protect shuttle car, cutter and loader operators, how to get cooperation between state mine inspectors and safety committees, precautions to be taken with Airdox and merits of drill holes for ventilation and escapeways were questions answered by a forum of which Earl R. Maize was moderator and the panel assistants George W. McCaa, general superintendent, Consolidation Coal Co. (W. Va.); Mr. Cunningham; A. Finley Harper, chief, Division of Safety & Inspection, Alabama; C. R. Stahl, assistant to the president, Eastern Gas & Fuel Associates; and C. E. Jones, safety director, District 29, UMWA, Beckley, W. Va.



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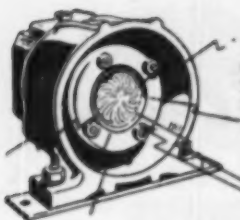
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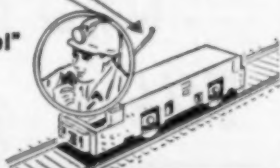


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As to shuttle cars, Mr. McCaa called for improved brakes and better steering and lighting equipment. He mentioned that it might be an advantage to change the brakes to dead-man type. In northern West Virginia, only 11 shuttle-car driver injuries have occurred in producing 15,000,000 tons of coal from 14 to 15 mines working in coal 60 in or thicker. He expressed dissatisfaction with frame grounding and suggested diesel cars. Mr. Cunningham, referring to operation of shuttle cars in low coal, called for a better reverse mechanism so drivers cannot back up without facing the way they are traveling. He believes in frame grounding.

Mr. Harper mentioned the necessity for a shield between the operator and the rib. Mr. Stahl said his company has installed shields and he mentioned that manufacturers do not equip shuttle cars with adequate warning signals and that his company is encouraging the changing of defective shuttle-car cables rather than making temporary splices.

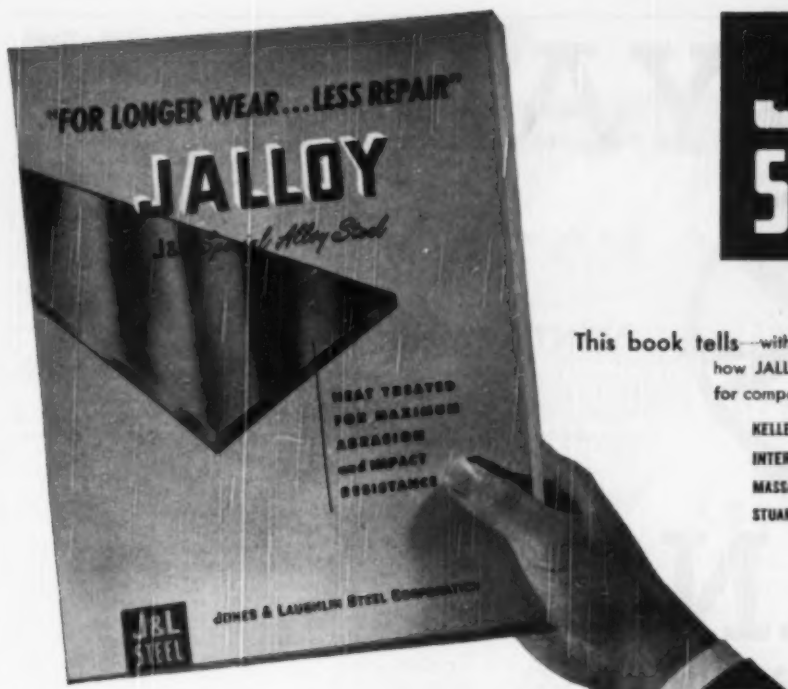
Referring to cutting machines, Mr. Jones called for a place for the helper to ride, even on old-type machines, and asked that the controls be positioned on the rear end of the machine so the operator will not have to get between the machine and the rib. Mr. Stahl suggested improved jack pipes—some surer method of gripping the roof, such as a renewable bit at the top end.

Mr. McCaa said it would be an advantage to have controls on both sides of a loading machine but they should operate in the same direction so a man will not be confused. Mr. Stahl said he has found controls on both sides of a loading machine a hazard.

On the subject of cooperation with safety committees, Mr. Harper said there is need for an exchange of ideas between the safety committee and the inspectors. Mr. Cunningham said that in some mines in Pennsylvania the safety committee is a glorified grievance committee. He therefore suggested the possibility of having the district offices of the UMWA pick the men to compose the safety committee. There is no lack of cooperation where the grievance committee and safety committee are not one.

Mr. Jones says there is no lack of cooperation in District 29. Asked if he had any suggestions to the state inspectors, he answered that were he a state inspector he would ask the safety committee to go around with him, would ask their advice and would attend the safety committee meetings. He also said that accident-prevention training is the answer to getting cooperation of the men of the safety committee.

In some mines in Alabama, said Mr. Harper, the safety committee and grievance committee are one and the same. In that state, nearly half of the fatalities are in small truck mines and at many of those mines safety



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MANY COAL-MINING COMPANIES make it a point to write us of personal changes on their staff for inclusion in COAL AGE'S "Personal Notes" section, as well as other news of their company, such as new mine developments, safety and production achievements, annual staff functions, etc., accompanied by pictures where suitable and available. You, too, are invited to write us whenever the occasion arises—it takes only a minute. Job changes from the individuals concerned also are welcome. Address: News Editor, COAL AGE, 330 West 42nd St., New York 18, N. Y.

committees have not been appointed. At this point Mr. Siak, speaking from the floor, said that in Kentucky the small mines have a better record of tons per fatality than the large mines—that machine controls are not safe enough.

The panel lacked first-hand experience with Airdox. Mr. Jones said there should be no trouble from its use if the 14 safety rules set forth by the manufacturer are followed. At the invitation of panel moderator Maize, Fred J. Bailey, safety director, Cardox Corp. explained its use including the 10,000-psi compressor, copper-tubing connections and the Airdox shell, which suddenly releases the high-pressure air into the hole when the control valve is moved to blow-down position. Questioned regarding flying shells, he said that happens very seldom.

Drill holes for ventilation and escapeways was the final subject discussed by the forum. Mr. McCaa said these holes have a definite place in isolated sections of large mines and that he understood a 36-in hole can be drilled to a depth of 250 ft for about \$10,000. Mr. Stahl said he has information that it is practical to drill a 4-ft hole to a depth of 800 ft but contractors will take that depth of job only on a cost-plus basis. He said a 4-ft hole will cost about \$75 per ft and a hole that size 400 ft deep will handle 40,000 to 50,000 cfm.

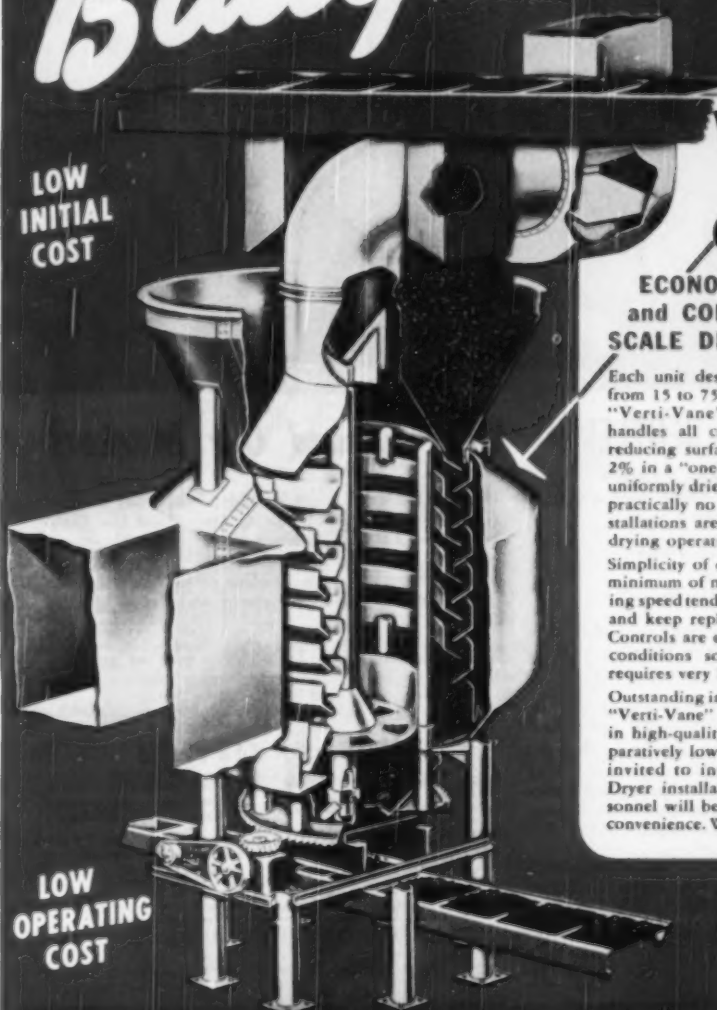
Mr. Jones remarked that the principal advantages of bore holes is to get men out in a hurry. In District 29, a 30-in hole cased to 26-in is now being put down to a depth of 622 ft at a cost of approximately \$40,000 or \$64 per ft. This is being installed as an escapeway but later will be used as a breather from a gassy section. A 5-in water gage will be required to force 20,000 cfm through this hole.

Escape of 100 men through a 3-ft bore hole at a mine near Springfield, Ill., was mentioned by George E. Bayles, mine inspector, American Re-insurance Co., Cincinnati. He warned that escape holes must be downcasts or they may prove death traps in case of emergencies.

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motor repair shop

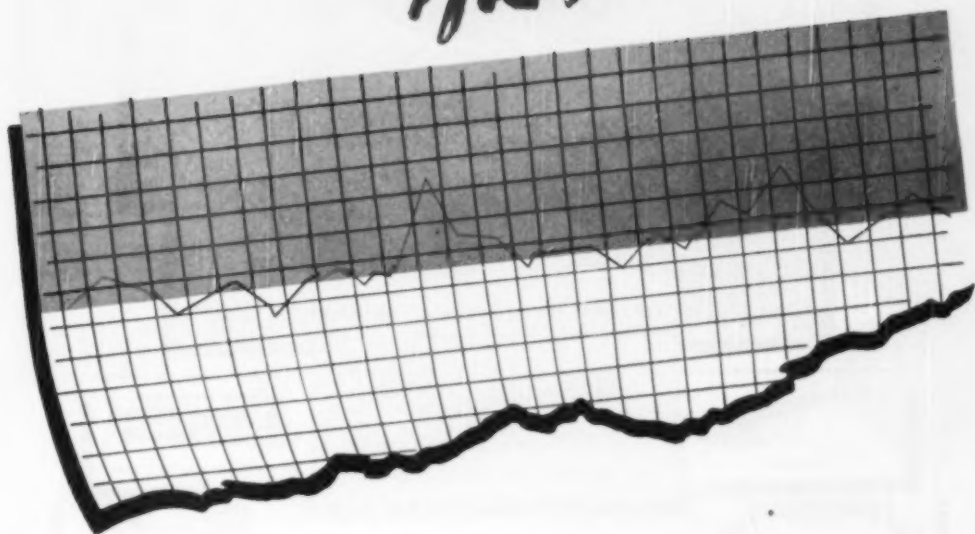


Chart the week-to-week demand and the week-to-week costs of your mine's motor maintenance-repair shop and you'll find that the red ink is concentrated at the periods of peak demand. Normally, the shop probably operates efficiently. But the peak demands cost overtime, and rushed, slighted work. To overcome that condition you'd have to over-equip and over-man your shop. And that means higher cost every day. Many mine operators, on the other hand, are operating such shops with very high efficiency. They are equipped and manned to handle the normal demand; they turn over the peaks — the red

ink jobs — to us. Thus they avoid the vicious circle of excessive labor costs and excessive overhead. They get work, too, comparable to the best they can do themselves. We've done so much mine motor and generator work we know how; we're efficient; our costs are low. That means *your* costs are low, both in your shop and in ours. Our engineers will be glad to come to your office to suggest experienced ways and means of taking the top costs out of *your* motor and generator work. Just drop us a line.

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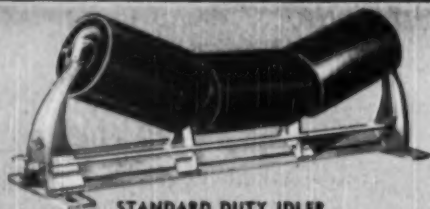
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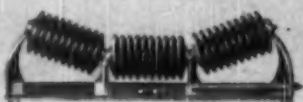
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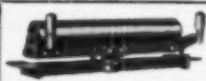
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Three-yard ESCO coal loading dipper on Thew-Lorain L80 shovel. Note flat digging lip and slight pitch of the teeth.

Loading Specialist for Greater Tonnage and Cleaner Coal

You can load more coal with an ESCO coal loading dipper — about 50% more than with conventional dipper buckets. And you'll get cleaner coal and a better cleanup in the pit. Here's why —

The ESCO coal loading dipper is a specialist, designed and built especially for coal loading. Not only is it from 10% to 15% lighter than ordinary dippers, but also it takes advantage of the comparatively light weight of coal. As a result, it is common practice to use buckets 50% larger than usual, with corresponding increases in production.

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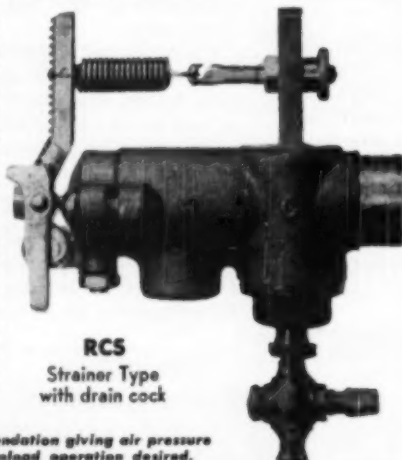
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W. Va. Groups Meet

(Continued from page 215.)


emphasized in his paper, "Electricity in Railroading." No diesels are used. The electrified section over the mountains, which uses the largest electric locomotives in the world, obtains its power from the company's own generating plant fueled with powdered coal. By regenerative braking, trains going downgrade return to the system 25% of the power they consume climbing uphill.

Load on the power plant fluctuates widely and rapidly, in fact dropping to zero at times. If the regeneration exceeds the demand, the excess power is dissipated in water rheostats in the river. Control of the powdered-coal feed and other boiler operations is entirely automatic and thus there is practically no lag in power generation in following the varying demand.

MINE-CONVEYOR DRIVES—W. F. Roberts, electrical engineer, Jeffrey Mfg. Co., in presenting a paper on "Electric Drives for Mine Conveyors," used slides of wiring diagrams to illustrate the various methods of obtaining sequence controls and conveyor protection (*Coal Age*, February, 1950). Answering a question, Mr. Roberts described the fluttering relay, which he had mentioned as used to accelerate and change speed of a shunt-wound variable speed conveyor motor. This relay has a series coil connected in series with the motor and a shunt-operating coil which aids the series coil magnetically. The series coil keeps the motor shunt field at full strength during acceleration to half speed, then flutters to cut the shunt-field resistance in and out to further accelerate the motor to full speed.

AC POWER UNDERGROUND—J. O. Cree, electrical engineer, West Virginia Engineering Co., in a paper "AC Power Underground," presented arguments pro and con. The balance appears highly in favor of ac for new mines, especially 100% conveyor operations (*Coal Age*, June, p. 174). West Virginia has about 20 mines entirely on ac, one of which uses only 2.7 kw-hr per ton, he reported. Two mines in the state use ac face power and dc haulage power.

COAL - RESEARCH DEVELOPMENTS—Research has indicated that the cost of making synthesis gas from coal is not far above a figure that would mean a tremendous market for bituminous coal, Dr. Schmidt said. The 500-lb-per-hour atmospheric-pressure gasification test plant at Morgantown, W. Va., which has been operating 2 yr and producing excellent results, shows that with coal costing \$3.50 per ton the total cost of cleaned synthesis gas for making 1 gal. of gasoline is 14.3c, and that the gasoline would cost 18.8c per gallon after de-



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4" Nagle Type "T" Pump in operation in a West Virginia heavy media float and sink coal preparation plant.

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ducting the value of the by-products. In a perfect process, using pressure gasification, a cost of 10.4c per gallon is indicated. Thus, at present, cost on a commercial scale should be somewhere between 10.4 and 18.8c, on the basis of \$3.50 coal. A pressure gasification unit is now under construction at Morgantown.

In the basic chemical industries and in fuel for power, Dr. Schmidt sees hope for the coal industry, mentioning that in 1948 this country produced ½ million tons of plastics. Research developments can broaden markets, he believes. Among the developments he noted during a recent European trip was the construction of a 13,000-kw gas turbine in Switzerland, which, although destined for use with oil as fuel, could be used with coal because it is of the closed-circuit type.

Underground gasification experiments are under way in Belgium and in Morocco, both in pitching seams. In the latter, however, a halt has been called because of failure of the seals. Commenting on our own experiments at Gorgas, Ala., Dr. Schmidt said that at the No. 2 installation, designed to determine if burning can be maintained, approximately one acre of coal (about 5,000 tons) has been burned to date between the first and second boreholes.

There must be safety and efficiency in the production of coal so that it will be made attractive in competition with other fuels, said Prof. Spindler. He outlined the need for research in roof bolting, ventilation for continuous mining and in preparation methods to obtain better quality, lower loss to refuse and greater uniformity. Although the industry may be headed temporarily toward a low point in demand, there will be a trend back to peaks of the recent past for the reason of population increase, if nothing else, Prof. Spindler said.

Preparation Facilities

Crystal Block Coal & Coke Co., No. 3 mine, Rawl, W. Va.—Contract closed with Southwestern Engineering Co. for one SWECO factory-built heavy-media separation plant for washing 7x½-in coal, to be included in a completely new tippie now under construction; feed capacity, 200 tph.

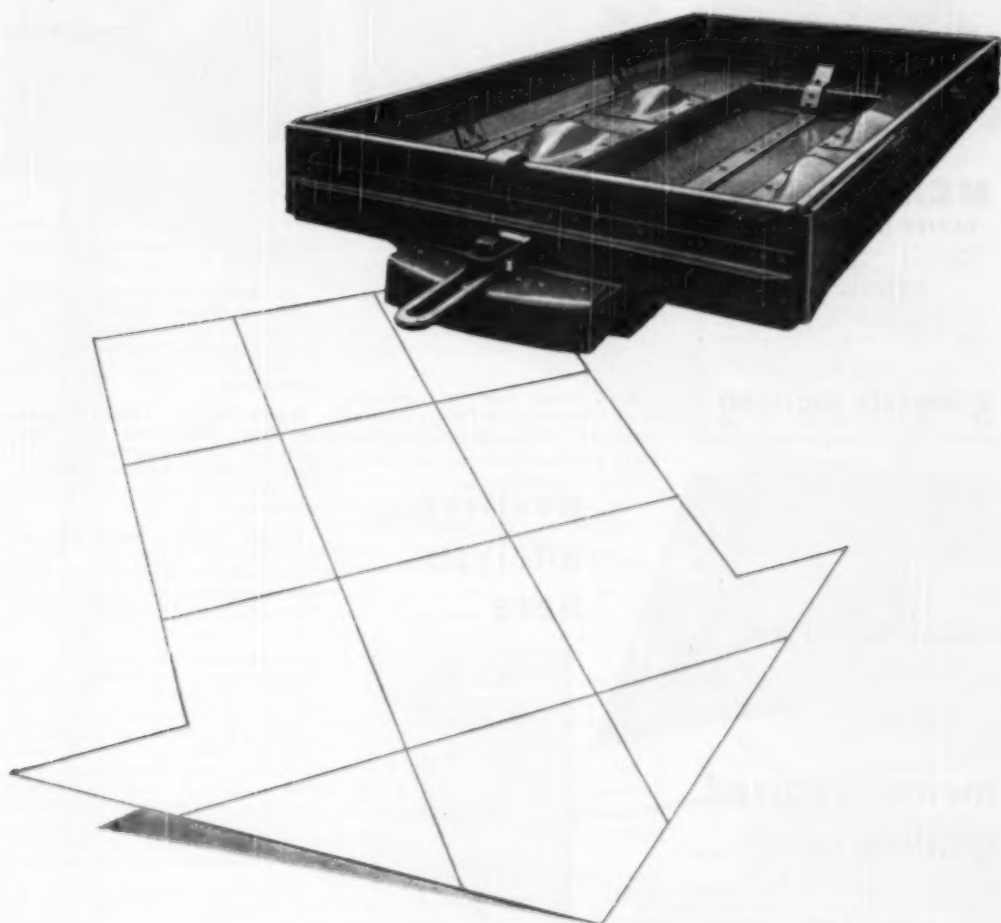
Moore & Son Coal Co., Marion, Ill.—Shipment by Deister Concentrator Co. of one SuperDuty Diagonal-Deck No. 7 coal-washing table for cleaning 1¼x½-in coal.

Barbara Kay Coal Co., Marion, Ill.—Shipment by Deister Concentrator Co. of one SuperDuty Diagonal-Deck No. 7 coal-washing table for cleaning 1¼x1½-in coal.

Christopher Coal Co., Arkwright mine, Morgantown, W. Va.—Shipment by Deister Concentrator Co. of



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DAVID FLOTA, elect. engineer, central shops, Sahara Coal Co., Harrisburg, Ill.

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Cherokee Coal Co., Danville, Ill.—Shipment by Deister Concentrator Co. of one SuperDuty Diagonal-Deck No. 7 coal-washing table for cleaning 1½x¾-in coal.

Black Prince Coal Co., Centralia, Wash.—Shipment by Deister Concentrator Co. of one SuperDuty Diagonal-

Deck No. 7 coal-washing table for cleaning 1½x0-in coal.

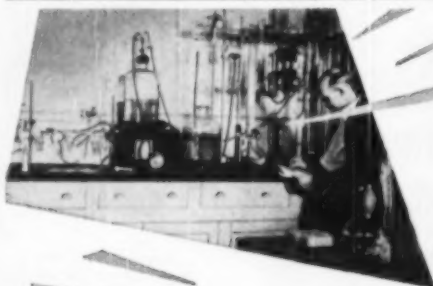
Cia. Nacional de Mineracao de Carvao-Barro Branco, Brazil, S. A.—Shipment by Deister Concentrator Co. of one SuperDuty Diagonal-Deck No. 7 coal-washing table for cleaning ¾x0-in coal.

Hanna Coal Co., Central Preparation Plant, Georgetown, Ohio—Shipment by Deister Concentrator Co. of eight SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning ¾x0-in coal.

Hillside Coal Co., South Tamaqua, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft-diameter Hydrotator to prepare Buckwheat No. 1 coal; feed capacity, 18 tph.

Youghiogeny & Ohio Coal Co., Dorothy mine, Glen Robbins, Ohio.—Contract closed with Heyl & Patterson, Inc., for fine-coal preparation and drying plant, employing Deister tables to prepare 100 tph of minus ¾-in coal; with drying to be done with a Heyl & Patterson thermal coal dryer; and water clarification for the closed water circuit to be accomplished with Heyl & Patterson cyclone thickener and a vacuum filter.

Truax-Traer Coal Co., Ceredo, W. Va.—Contract closed with Heyl & Patterson, Inc., for two manifolds of 14-in-diameter cyclone thickeners to process slurry at 1,800 gpm and recover 50 tph of ¾x0-in coal from the waste coal slurry.



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Pound for pound, Bethlehem mine roof ties have much more beam strength than conventional channels, and therefore provide a greater factor of safety. The explanation lies in the Bethlehem design, whose double-center-rib feature offers higher resistance to bending and sagging.

These steel roof ties are available in Nos. 5, 6, and 9 sections—numbers that correspond to the weights in pounds per foot. They can be supplied in any desired length, though lengths ranging from 10 to 18 feet are usually preferred.

The ties are held in place by Bethlehem roof bolts, which are driven into holes previously prepared in the overlying strata. The upper end of each bolt is slotted to accommodate a wedge, this being forced deeper into the bolt when the back of the hole is reached. As the bolt-end expands, the spreading action causes a very tight fit against the sides of the hole. Bethlehem is also in a position to furnish headed bolts for use with expansion sleeves.

To permit driving of the bolts at different angles, three styles of washers are offered—a flat plate type and two angle types. Fitting snugly into recessed holes in the tie section, these washers make it possible to install the bolts at 90, 60, or 45 degrees as dictated by local conditions.

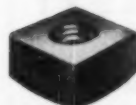
If you'd like more details, ask a Bethlehem man. He'll be glad to oblige—and to see that you get prompt deliveries of the sets in any combination.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor; Bethlehem Steel Export Corporation



The three types of washers available for use with Bethlehem roof tie sets: plate for 90-degree assembly and angles for 60- and 45-degree assemblies, respectively.



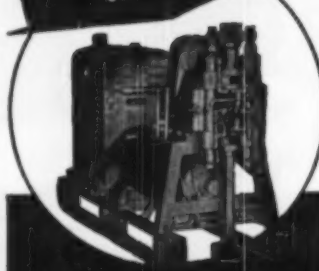


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ly established by the geological professions in the United States. Operating as an affiliate of the National Research Council, which is a non-government scientific organization endowed with private funds, the institute furnishes "central representation for the geological sciences in all matters which are of interest to the entire profession."

The institute is particularly interested in broadening applications of geological science to industrial needs, and seeks the cooperation of the mining and mineral industries, it is reported. A properly organized and operated program which cuts across the lines of specialization within the geological sciences will render valuable professional service to each geologist and geophysicist, and will also make a great deal of valuable information available to owners and operators the institute says.

The AGI is made up of scientific societies rather than individual members. Its affairs are directed by a board of directors composed of two representatives from each of the member societies, which are: American Association of Petroleum Geologists; American Geophysical Union; AIME; Geological Society of America; Mineralogical Society of America; Paleontological Society; Seismological Society of America; Society of Economic Geologists; Society of Economic Paleontologists and Mineralogists; Society of Exploration Geophysicists; and Society of Vertebrate Paleontology.

In addition, non-profit organizations of a regional or local nature may join the institute as affiliates, including professional or amateur groups and non-profit organizations of operators, owners and managers of mining operations which are interested in the applications of geological science.

The third class of membership, designated as Associates, includes those business organizations who contribute to the support of the institute because of their interest in geological science and its applications.

The current president is William B. Heroy, executive vice president, Geotechnical Corp., Dallas, Texas. Full information about the institute is available from: David M. DeLo, executive director, American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C.

Coal Publications

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10 1/4-in. paper, mimeographed.

Review of Dust-Allaying Practices at Working Faces in Some Bituminous Coal and Lignite Mines, by J. J.

To Coal Producers:

In re; CONTINUOUS COAL MINING AND LOADING MACHINES

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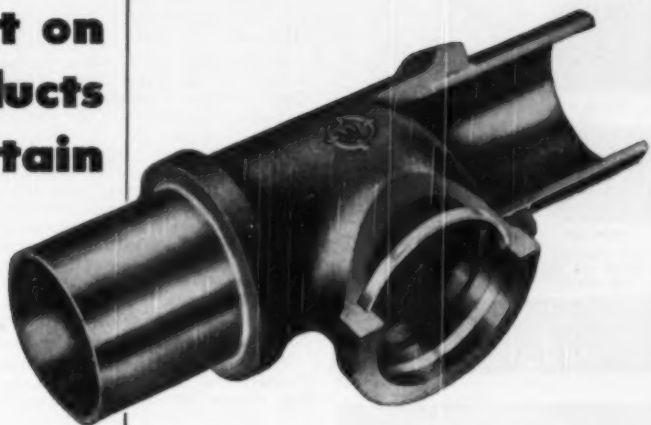
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Forbes, R. K. Franklin and S. T. Reese. I. C. 7566. Survey of dust-allaying methods used in 1,637 handloading and mechanical mines employing 290,453 men and producing about 1,755,080 tpd.

Methods of Excavation and Roof Support Used in Some Recently Excavated Tunnels, by S. P. Polack. I. C. 7568. Methods used in six recently constructed railroad, vehicular and water-carrying tunnels, all differing in size, shape and geological conditions.

Permissible Mine Equipment Approved During the Calendar Years 1947-49, by H. B. Brunot. I. C. 7569. This list supplements I. C. 7432 and supersedes I. C. 7465.

Extinguishing Fire With Carbon Dioxide in the Valier Mine, Valier Coal Co., Valier, Franklin County, Ill., by James Westfield, H. C. Brumbaugh and R. W. Whittaker. I. C. 7563. 10 pp. Sealing the fire area failed because explosions blew the seals out and flooding the fire area with water was unsuccessful because the dams were not strong enough. However, introduction of carbon dioxide in the area to dilute the gases did extinguish the fire within about 11 hr. To avert future fires, the company is installing a ground-fault protective system.

Fighting a Fire in No. 59 Mine, Peabody Coal Co., Springfield, Sangamon County, Ill., by J. A. O'Connor, J. S. Malesky and T. C. Higgins. I. C. 7564. 20 pp. Carbon dioxide introduced into a sealed area can extinguish a fire quickly provided it can be retained in the area. An extremely hot fire can be loaded out by using a loading machine and applying rock-dust. The remedy for nearly all electrical fires is protection against overcurrent and overheating. These are only a few of the recommendations growing out of experience at No. 59 mine.

Fuel-Burning Equipment Dimensions Required by Smoke-Abatement Ordinances, by J. F. Barkley and R. E. Morgan. I. C. 7557. Restrictions on burning-equipment sizes imposed by 20 cities and counties, published as an aid to municipalities and private concerns in achieving smokeless combustion.

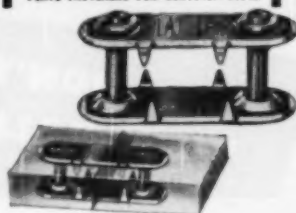
Coal-Mine Injuries and Employment, by V. E. Wrenn and E. T. Jarboe. CMI No. 24. The safety record in 1949 was 6% better than the 1948 record, there being, in 1949, 37,078 injuries, of which 593 were fatal. This report records additional statistics for bituminous and anthracite in terms of total injuries, man-hours of exposure and fatal and non-fatal rates.

The following publications may be obtained at the prices and from the sources noted for each.

Weld Design, by H. D. Churchill and J. B. Austin. Prentice-Hall, Inc.,

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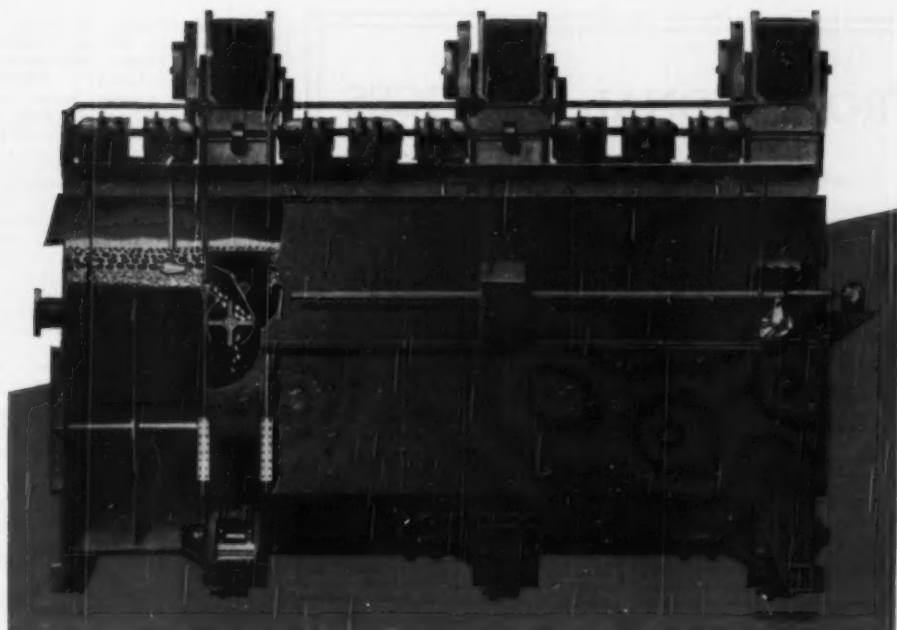


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Industrial Division, 70 Fifth Ave.,
New York 11, 211 pp. 5½x8½-in;
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theoretical problems in fabricating
welded steel machine parts; how to
specify a weld; types of welded joints
and their drawing symbols; welding
cost estimating.

Geology and Coal Deposits of the
Jasonville Quadrangle, Clay, Greene
and Sullivan Counties, Indiana, by
Charles E. Wier. Map C 1, Coal In-
vestigations Series. 38x50 in. \$1, Di-
rector, U. S. Geological Survey, Wash-
ington 25, D. C., or Division of Ge-
ology, Indiana Dept. of Conservation,
Bloomington, Ind. Two colored maps
on a single sheet: (1) topography and
geology and (2) coal deposits. Scale,
1 in = 2,000 ft; area mapped, 58 sq mi.

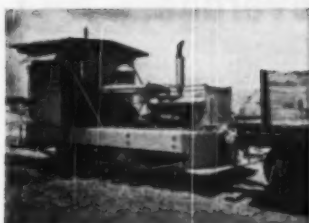
Proceedings: Fifth International
Conference of Directors of Mine
Safety Research, by H. P. Greenwald.
U. S. Bureau of Mines, Bulletin 489.
223 pp. \$1.25, Supt. of Documents,
Government Printing Office, Wash-
ington 25, D. C. Over 20 papers on
explosives, gases, electrical machinery,
diesel engines and safety work.

The Fire Clay and Whitesburg
Coals in the Hyden Quadrangle, Leslie,
Clay and Perry Counties, Kentucky,
by J. E. Johnston and W. E. Heck.
Map C 5, Geological Survey Coal In-
vestigations Series. 32x36 in. \$1, Di-
rector, U. S. Geological Survey, Wash-
ington 25, D. C. Map shows location
and extent of outcrops, thickness and
pitch of seams. Accompanied by tables
showing coal analyses and reserves
and a text describing the geology.

Kent's Mechanical Engineer's Hand-
book, 12th Edition. John Wiley &
Sons, Inc., 440 Fourth Ave., New York
16, N. Y. 2 vols., 3,000 pp. Cloth. \$8.50.
Revisions reflect advances in mechan-
ical engineering made since 1936.
Entire text has been rewritten and
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Ohio Geology: List of Publications
and Maps on the Geology and Mineral
Resources of Ohio, 16 pp. 7x9-in;
paper. Free, Division of Geological
Survey, Ohio State University, Col-
umbus 10, Ohio. List of publications
by the Survey plus selected publica-
tions by related state departments
and the U. S. Geological Survey. In-
cludes also an index map of Ohio
showing available topographic maps.

High-Sulfur Pittsburgh Coal: Up-
grading in Southwestern Pennsyl-
vania and Northern West Virginia,
by Thomas Fraser, W. L. Creutz and
A. L. Bailey. U. S. Bureau of Mines,
Bulletin 483. Price: 30c, Supt. of
Documents, Government Printing Of-
fice, Washington 25, D. C. Upgrading
high-sulfur Pittsburgh-bed coal for
metallurgical use can be accomplished
by blending, selective mining, low-
gravity separation, fine crushing and
froth flotation and by combinations of
two or more methods.



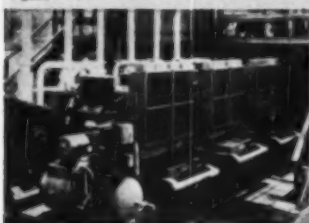
LOCOMOTIVES—Repowered with GM Diesel Torque Converter unit, this 22-ton locomotive loads double the tonnage without ever shifting into low gear.



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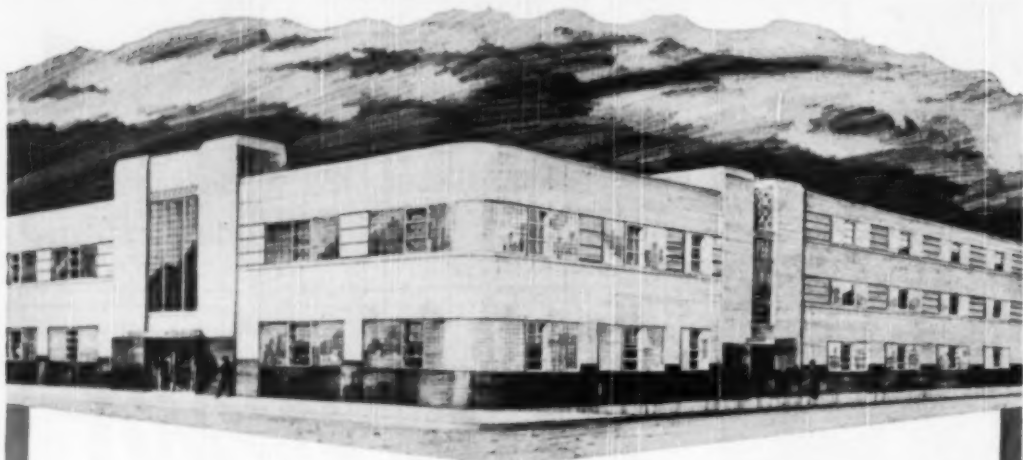
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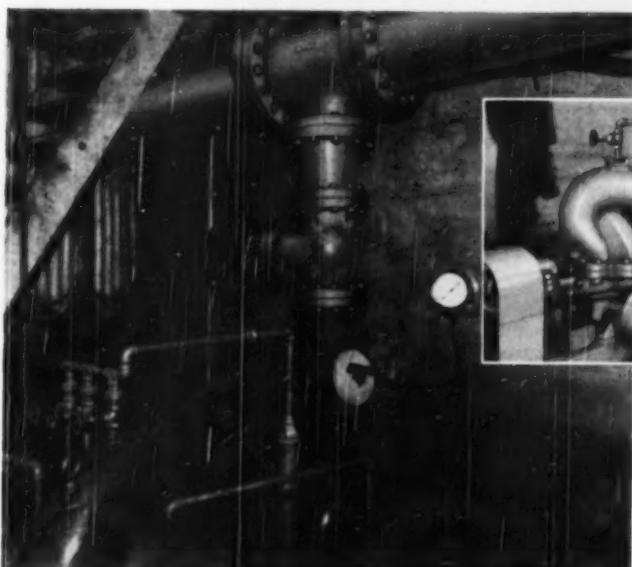
Crane Swing Checks—brass trimmed or all-iron—may be used in horizontal lines or in vertical position for upward flow. Well proportioned oval-shaped body provides ample flow area around disc when valve is open. Crane design prevents disc from sticking in open position. Flanged, screwed, or hub ends available. See your No. 49 Crane Catalog.

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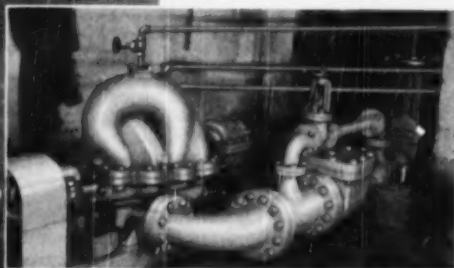


No. 373, Flanged Check. Working Pressures: Sizes 2 to 16-in.: 125 pounds steam; up to 200 pounds water, oil, gas, depending on size. Sizes 18 to 24-in.: 150 pounds water, oil, gas.

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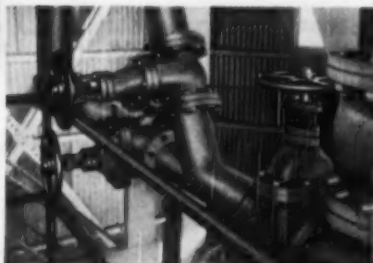


LIFTING WATER from a deep silver mine. Crane equipment includes swing check valve without outside lever and weight, gate and globe valves, and flanged fittings.



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SETTLING CONE in coal preparation plant showing Crane 125-pound iron body wedge gate valves with non-rising stem.



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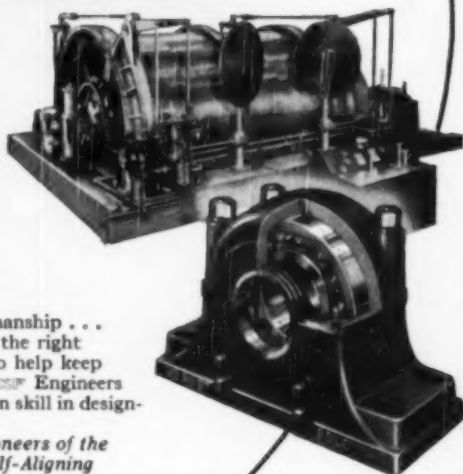
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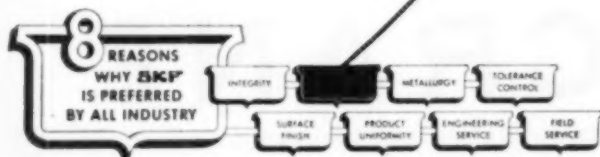
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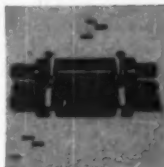
End corrosion troubles for good. Use Polyethylene plastic pipe that is resistant to acids and alkali. It is light, flexible and tough . . . withstands normal operating pressures and temperatures . . . cuts installation costs up to 60% . . . requires minimum maintenance.

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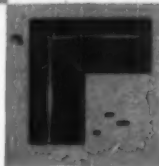
Illustration shows a 200-ft. coil of 2" pipe. Approximate weight, 90 lbs.



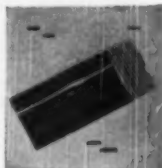
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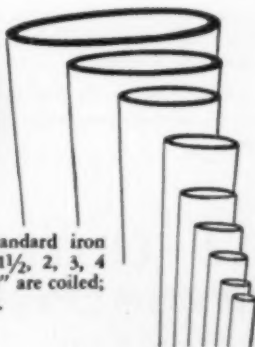


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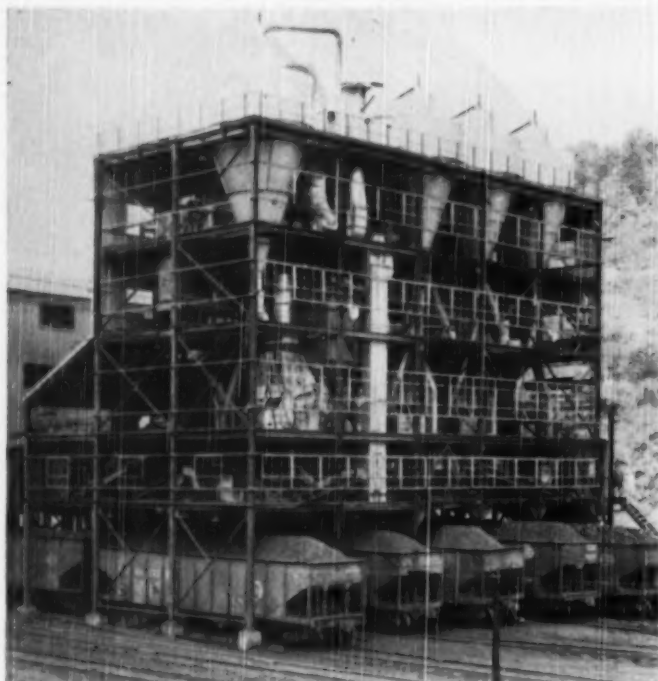
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"Skeleton View" of Roberts and Schaefer - equipped dry cleaning plant at Trotter Coal Company's Bunker Mine, Cassville, W. Va.—photographed before steel siding was installed.

**PREPARATION
PLANTS NOW
IN OPERATION
SHOW
HOW TO
DRY CLEAN
LARGER
COAL SIZES**



R&S-equipped dry cleaning plant operated by Lion Coal Corp., Wattis, Utah—photographed before steel siding was installed.

Research in the field of dry cleaning coal has moved so fast that it's hard to realize what great strides have been made. But strides have been made . . . and the two air cleaning plants shown on this page are eloquent evidence of that fact.

Air cleaning up to 1 1/4-inch coal. Improved position in steam-coal market . . . raising shift capacity from 1700 to 2600 tons. That is a report on the R&S Super-Airflow units at Trotter Coal Company's Bunker Mine Plant, Cassville, West Virginia. (Illustrated above.)

Successful dry cleaning of sizes up to 1 5/8-inches . . . ordering a second R&S Super-Airflow to double plant capacity: Lion Coal Corp., Wattis, Utah. (Illustrated at the left.)

Entire mine output crushed to 1 1/4-inches and dry cleaned by Roberts and Schaefer Company Super-Airflow units . . . reports American Eagle Collieries of Southern West Virginia.

A good idea: When you are looking for future improvements in dry cleaning of coal, do as these companies did—consult with Roberts and Schaefer Company.



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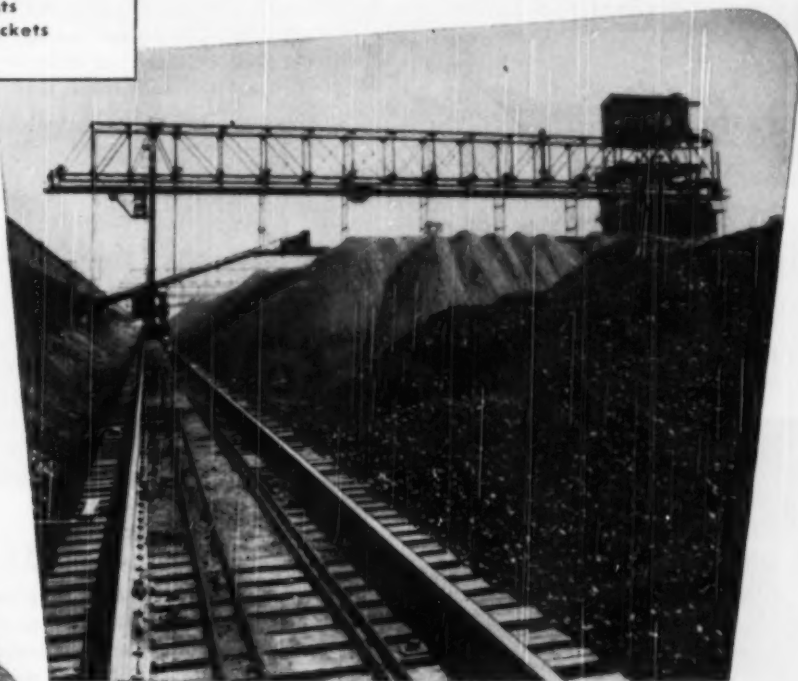
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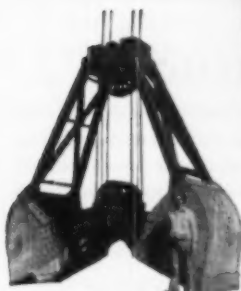
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For fast and efficient action



One of two 6-ton Coal Handling Bridges in this installation.



6-ton Wellman Williams Type Coal Bucket used with these bridges.

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The BAKER Timbering Machine, which has successfully mechanized the erection of timbers, is now available with a Drilling and Bolting Head—making it possible to save time on *Roof Bolting* and *Timbering* with the same machine. This machine is battery powered and pneumatic rubber tired. The boom has a 90° swing to either side, and permits operation in seams as low as 36".

TIMBERING

Baker Timbering machine saves at least 50% of the labor costs and eliminates the hazards of manual timbering. Also provides an efficient means of transporting and sawing timbers. Available with or without Drilling and Bolting Head.



**Drill and Bolting Head on
Portable Mount also available**

Manufactured by
THE BAKER-RAULANG CO.
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BOLTING

With "V" Type Drilling and Bolting Head, the same machine makes a real saving in roof bolting—Full hydraulic power and control means constant pressure on drill feed and easy positioning with relation to roof or floor. Drill and torque wrench combined in single head.

Baker Mine Tractor, Timbering Machine and Trike have U. S. Bureau of Mines approval as permissible equipment.

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Exclusive Coal Mine Representatives
J. H. FLETCHER & CO.
Chicago, Illinois • • • Huntington, W. Virginia

Baker MINE EQUIPMENT

POINTING THE WAY
TO GREATER PROFITS
WITH AMERICA'S MOST POPULAR COAL CUTTING BIT

CINCINNATI REVERSIBLE DOUBLE ENDED DUPLEX BIT

YEAR after year the Cincinnati reversible, double ended Bit has POINTED THE WAY TO GREATER PROFITS in an ever increasing number of America's foremost mines. The Cincinnati Duplex Bit is made exclusively for use in the Cincinnati Duplex Chain and is designed and scientifically heat treated to fit your particular cutting requirements. This is the preferred combination although the STANEX MOUNTING . . . Comprising the STANEX BIT with SPECIAL STANEX HOLDER can be used in any standard chain that accommodates the regular $\frac{1}{2}$ " x 1" bit. This enables mines equipped with standard chains to enjoy some of the advantages of the Duplex Designed Bit during a period of changeover to the Duplex Chain.



- The Cincinnati Duplex Bit used with Cincinnati Chains uses less power.
- Cincinnati Duplex Bits are made of high grade alloy steel . . . expertly heat treated.
- Cincinnati Duplex Bits with Cincinnati Chains cut faster . . . assure coarser cuttings . . . decrease machine maintenance costs.
- Outlasts and outcuts ordinary $\frac{1}{2}$ " x 1" bits.
- Materially reduces bit setting time . . . eliminates bit sharpening operations.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

Here is a bearing that cuts
manufacturing and maintenance costs



the **M-R-C** *Synthe-Seal* bearing
Pat. Nos. 2,307,049

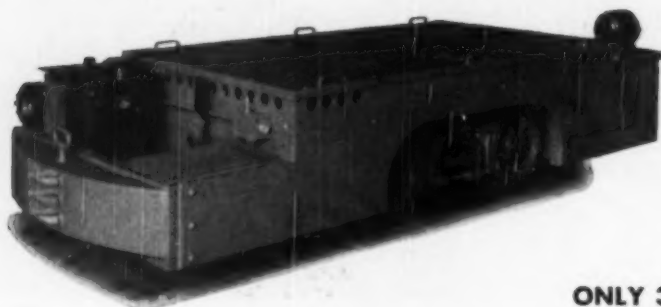
A standard-dimension ball bearing with a removable synthetic rubber seal for keeping out dirt, grit and moisture and for keeping in lubricant.

MARLIN-ROCKWELL CORPORATION, Jamestown, N. Y.

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FOR
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ATLAS 3-TON TYPE-F



ONLY 30" HIGH

SURPRISING PERFORMANCE
VERY LOW MAINTENANCE
ATTRACTIVE FIRST COST

TWO MOTORS — ENCLOSED SPUR GEAR DRIVES
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JUST THE PLAIN SPUR GEARING WHICH HAS MADE
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THIS LOCOMOTIVE IS REALLY GOOD . . .

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Mr. W. Hess of The H & H Coal Co., Dixonville, Pa.
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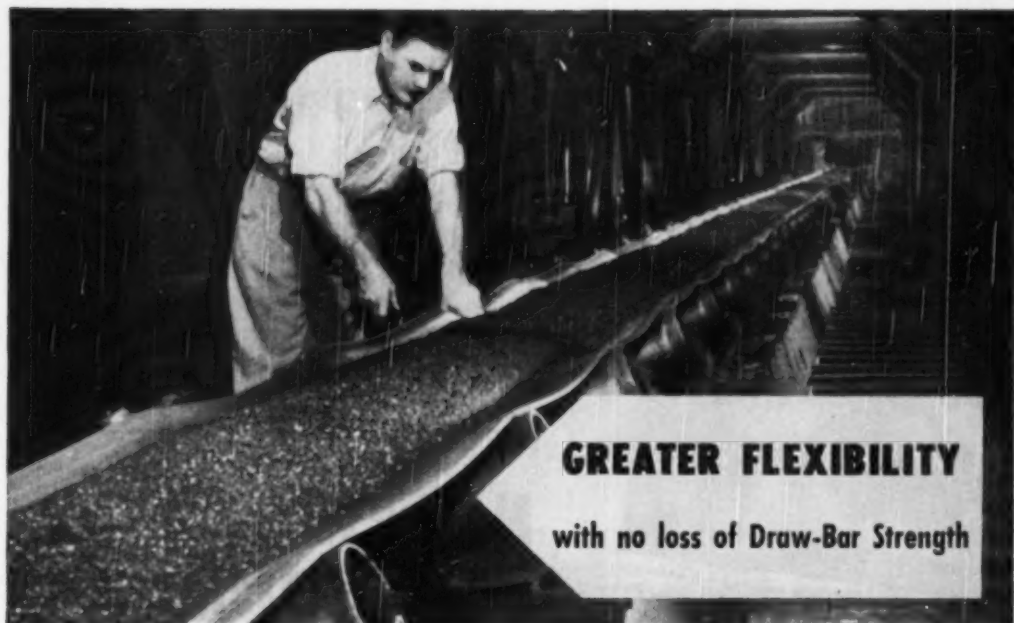
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GREATER FLEXIBILITY

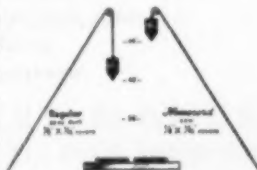
with no loss of Draw-Bar Strength

Homocord Conveyor Belt Runs Truer ... Carries Bigger Loads Without Spilling

Supreme lateral flexibility enables a Homocord Conveyor Belt to trough naturally. It runs truer in the idlers than conventional belts because the Homocord construction makes adequate contact with the center roller at all times. This insures safe transportation of maximum loads without spillage. Homocord Conveyor Belt can be made endless with vulcanized splice or metal fasteners with *no loss of draw-bar strength* over the heaviest conventional duck conveyor belts.

Tests Prove Homocord Has 50% More Cushion Against Impact

In a "Guillotine" Test, as shown here, a heavy metal weight ground to a blunt edge is dropped from various heights on samples of belting. When dropped from a height of 40" on a sample of 4-ply



32-oz. duck belt with 1/8" top cover and 1/16" bottom cover, the impact cuts through the cover to the duck. On the other hand, a 4-ply AEH Homocord sample with 1/8" top cover and 1/16" bottom cover begins to show the same impact effect from a drop of 60"—thus proving at least 50% more cushion in the Homocord strength member.

Homocord is priced a little higher but it costs far less on every installation where it is recommended. Customers report remarkable service and tonnage records. If you have not "discovered" Homocord, by all means call your Manhattan distributor or a Manhattan belting engineer and let him show you the greater value in this modern belt.

DO YOU HAVE THIS FOLDER?

Bulletin No. 6906 on Homocord should be in your files.

A copy will be mailed to you, on request.



Ray-Man, New Tension-Master Conveyor Belt for Long Lifts

... the first to be engineered with rayon strength members. Recommended where it is desirable to reduce the number of transfer points on a long lift.

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MODERN MINES

roll 'em over

quickly, easily, safely
with

NOLAN ROTARY CAR DUMPS

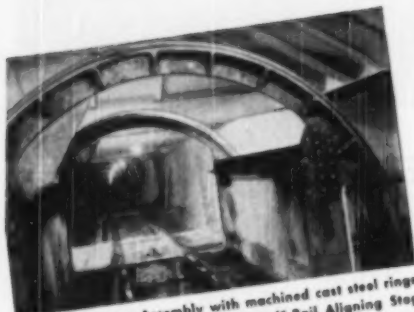
*Gear-Driven . . . Chain-Driven . . .
Friction-Driven . . . with Patented
Positive "Starting Dog"*

Steady, efficient coal production in this modern operation is aided by a Nolan Rotary Car Dumper. Several distinctive Nolan features help achieve this goal:

1. Patented Positive Starting Lug.
2. Patented Positive Rail Aligning Stop.
3. Heavy Machined Cast Steel Rings.

There are many other quality engineering advantages built into the Nolan Rotary Car Dumpers—features that encourage better, safer, speedier coal delivery, at lower costs.

Write for illustrated catalog giving complete details, and ask us to help solve your problems through our long experience in car control and dumping operations.



• Heavy Cage Assembly with machined cast steel rings. Rails positively aligned by "Patented" Rail Aligning Stop.



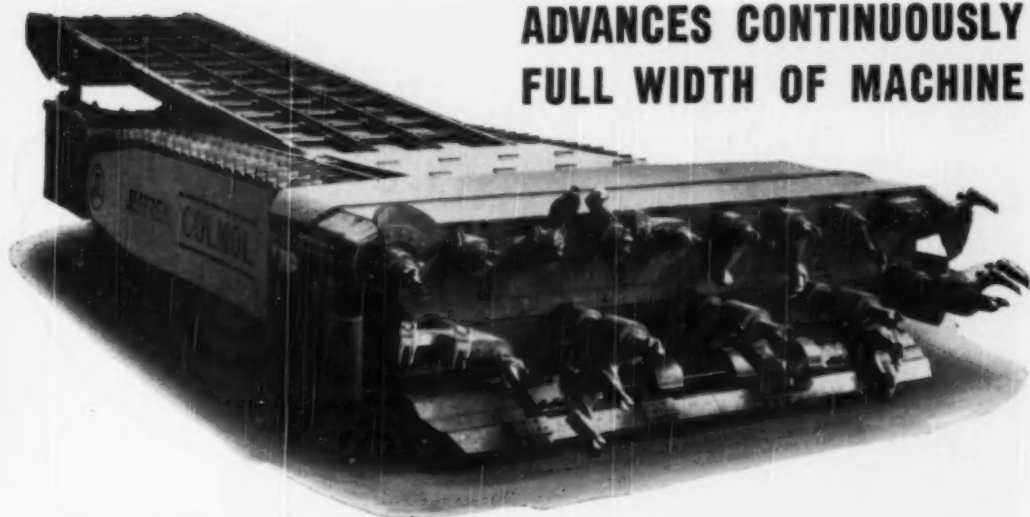
• Push Button starting. Dump starts slowly—no slipping—then rotates at higher speed for quick cycle.



• Dump slows down for stopping—no jar—rail aligning stop is automatic.

THE NOLAN COMPANY
BOWERSTON, OHIO





ADVANCES CONTINUOUSLY FULL WIDTH OF MACHINE

No fooling around with the COLMOL—a mobile, continuous mining machine in every sense of the word. It bores its way in, advancing continuously at the rate of 2 to 3 feet per minute—to a width of 9½ feet.

Various models are in production to accommodate seams from 30" to 72". Each model is adjustable by spreading the head or by using breaker arms of greater radius. The COLMOL is rugged—the powerful construction of all moving parts renders it formidable for the toughest, roughest type of mining service. The presence of hard slate binders and sulphur balls in various seams makes this requirement indispensable.

As the machine advances, the sweeping action of the rotary breaker heads directs the coal toward the center and on to the conveyor. This action in concert with the shearing blade completely cleans the mine floor. You'll like the COLMOL and its production rate of 3 to 5 tons per minute . . . its ultimate daily per man output resulting in production costs of a fractional part of conventional mechanized mining.

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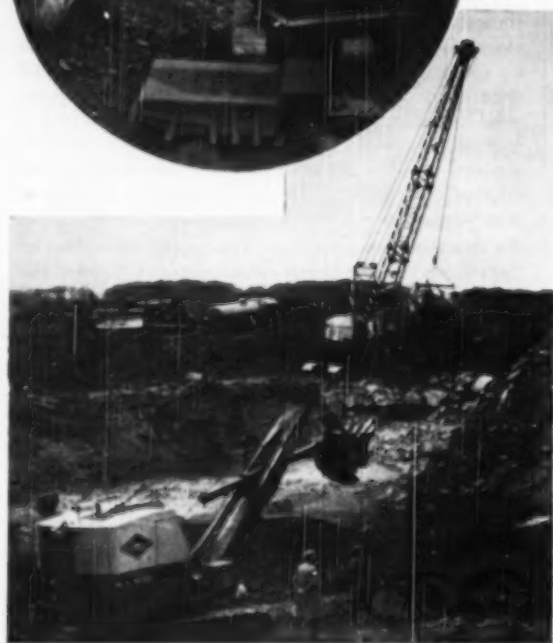
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LIMA RUGGEDNESS and DEPENDABILITY make GREATER PROFITS possible



● The narrower your margin of profit, the more important to you that your equipment be designed and built for maximum output and continuous, dependable, trouble-free service.

That's why LIMA Shovels, Cranes and Draglines are ideal for quarry and open-pit mining operations. Simplicity of design means fewer parts to get out of order. Important bearings are anti-friction type. Large drums increase output and minimize cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. Large clutches and brakes reduce lining wear. Extra rugged machinery base, truck and front-end equipment provide ample strength for heavy, punishing service.

These are only a few of the reasons why LIMA machines are your best investment when profits depend upon low operating and production costs.



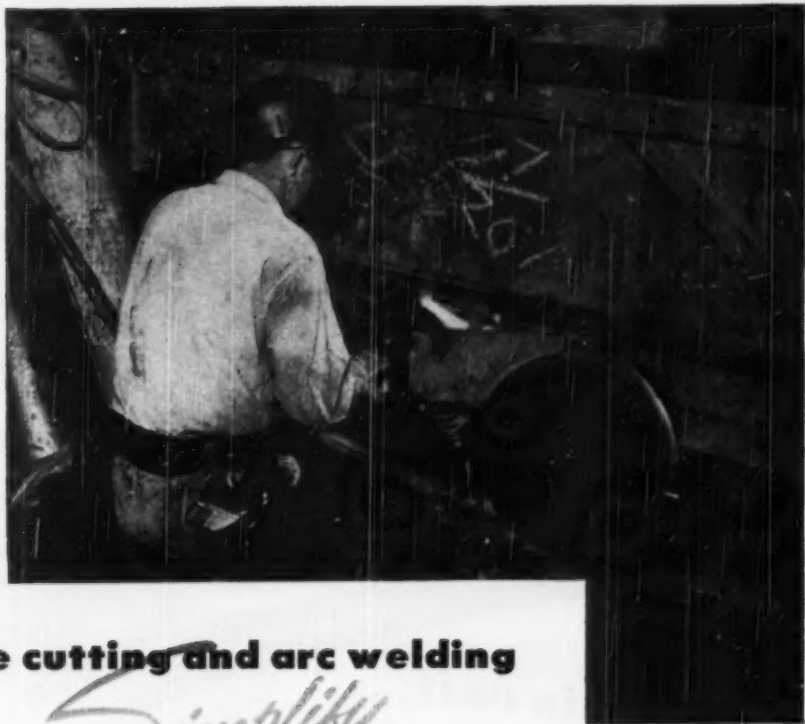
The LIMA line includes Shovels $\frac{1}{4}$ to 6 yards, Cranes to 110 tons, and Draglines variable. Rubber-mounted truck cranes in 20 and 35 ton capacities.

Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: Lima Locomotive Works Division; Miles Tool Works Co.; Hooven, Owens, Rentschler Co.





Flame cutting and arc welding

*Simplify
Maintenance*

Laborious, time consuming colliery maintenance jobs can now be performed quickly and at low cost with the oxyacetylene flame and electric arc.

Typical examples include: reclamation and repair of worn motor cases by welding resulted in a saving of several thousand dollars for one colliery. In another, a skeleton-type frame for a six-ton locomotive, which had been fractured in four places, was repaired by arc welding.

For repair work on mine-car bodies old bolts are easily removed with a cutting torch. Damaged car sections can be cut away, new sections fabricated on flame cutting machines and arc welded into place. Bent members can be straightened by flame heating.

These are just a few of the many profitable Airco oxyacetylene flame and electric arc applications in and around mines. Others include flame hardening of machine parts . . . rebuilding of worn surfaces . . . hard facing of equipment subjected to wear . . . and numerous other repair and fabrication jobs.

For further information about these cost-cutting, time-saving processes write your nearest Airco office.



AIR REDUCTION

Offices in All Principal Cities

HEADQUARTERS FOR OXYGEN, ACETYLENE AND OTHER GASES...CALCIUM CARBIDE...GAS CUTTING MACHINES...GAS CUTTING APPARATUS AND SUPPLIES...ARC WELDERS, ELECTRODES AND ACCESSORIES



was this call necessary?

Some "Moral Insurance" here might have avoided a serious accident

Workmen's compensation is a fine thing—but it can't replace a mangled arm.

Safety laws prevent many accidents—but they can't cover every hazard of an individual plant.

Accident prevention which goes *beyond the law* is an unwritten responsibility of every employer. It is his "Moral Insurance" for his employees welfare.

The premiums for "Moral Insurance" are not high. They do not have to be paid for in fancy safety gadgets. Their cost is simply the institution of common sense safety regulations covering all local hazards—enforced by employee committees with the full support of management.

Yes—"plant safety" is a mutual job.

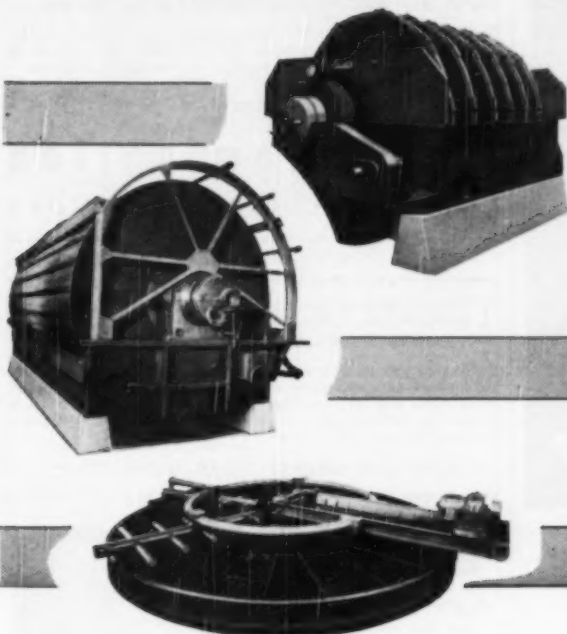
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***Greatest Filter Type Selectivity Available—**

***Correct Type Selection Increasingly Important**

Oliver United offers from its extensive line of filters, the following three types for the handling of washery fines:

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OLIVER PANEL VACUUM FILTER
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You know about the American Filter. For years it has been recognized by washeries as an effective and economical dewatering unit. It is being purchased in increasing numbers.

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Our many years of filtration experience in this field plus facilities for making field or laboratory tests would assure you of the proper type of Oliver United filter for the work to be done.

OLIVER UNITED FILTERS



INC.

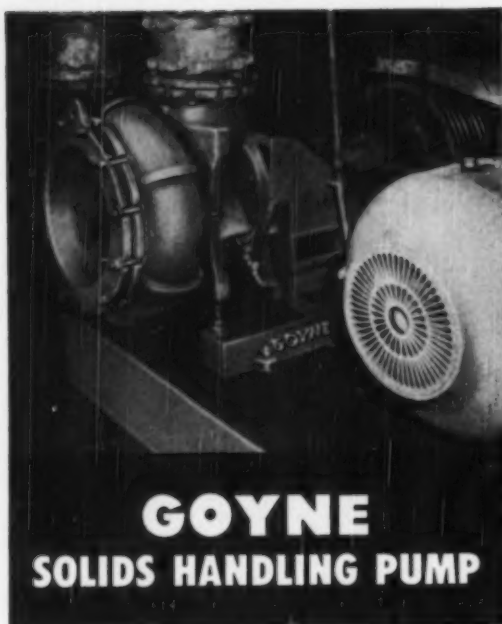
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Feature: LOW-COST OPERATION

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Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

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4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.
5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyme Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.



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3 Volumes—\$8.25, Payable in Three Easy Installments

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Can you answer these questions—

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Can a miner live in air in which the oxygen content is reduced to 17 per cent?

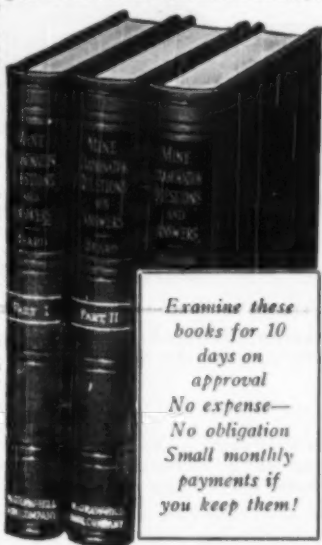
Name five duties imposed on mine foremen by law?

In what time can an engine of 40 effective hp. pump 4,000 cu. ft. of water from a shaft 360 feet deep?

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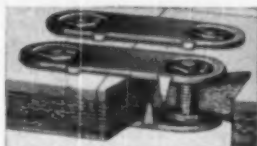
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2" x 10 ft.	\$7.00	3" x 10 ft.	\$12.00
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1 1/2" x 25 ft.	10.25
1 3/4" x 25 ft.	11.00

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THE ELRECO CORPORATION
CINCINNATI 25, OHIO



A Modern Pioneer for New Frontiers

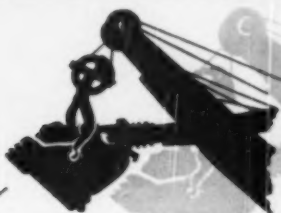
In expanding the coal-stripping frontiers and searching for more economical means of uncovering coal at increasing depths, many mine owners have found the ideal solution in Bucyrus-Erie walking draglines — like the 8 to 10 cubic yard 450-W shown working in a Kentucky mine. The 450-W/ swings booms 165 to 200 feet long, digs as deep as 130 feet . . . can dump material a maximum 412 feet from digging point. It offers unusual stability, easy accurate control and carefully balanced power for a fast cycle that boosts production. Its simple, reliable walking mechanism carries the

450-W safely, surely over soft, loose or wet ground without destructive jars or shocks, and the entire machine is simply designed and ruggedly built for a lifetime of dependable service with low maintenance costs. We will be happy to supply full information on the 450-W and other walking draglines in the outstanding Bucyrus-Erie line.

BOLSO

**BUCYRUS
ERIE**

SOUTH MILWAUKEE, WISCONSIN



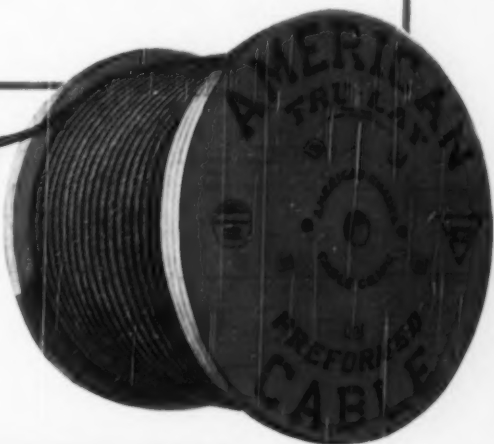
*Just as some shovels
last longer than others...*

TRU-LAY...

*will give you more of everything
you want from **wire rope***

• TRU-LAY WIRE ROPE is preformed and made by the men who originated preforming. In its toughness and strength are properly combined to give better and longer service regardless of job conditions. Users like its easier handling qualities and the fact that it is available in all constructions, lays, centers and grades.

Specify TRU-LAY—the wire rope that's engineered to cut costs and improve production—and get the most of everything you want from wire rope.



ACCO

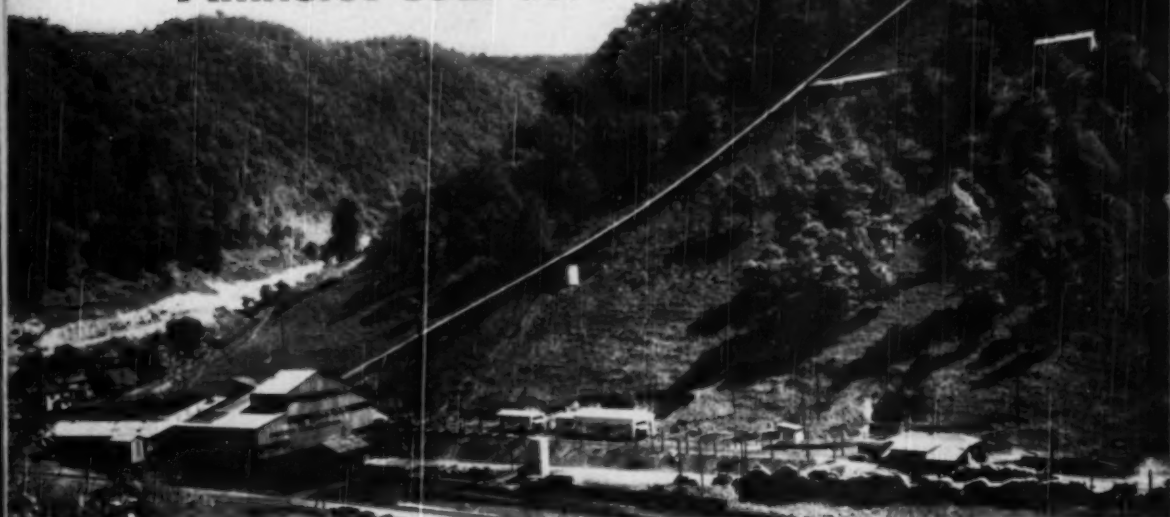
In Business for Your Safety



**AMERICAN CHAIN & CABLE
AMERICAN CABLE DIVISION**

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York,
Philadelphia, Pittsburgh, Portland, San Francisco, Seattle, Tacoma, Bridgeport, Conn.

How Coal from 3 Seams is Loaded at Amherst Coal Co.



LINK-BELT COAL WASHER



**THIS STEEL WASHER DOES
ONE JOB WELL, BUT . . .**

The coal washer shown below does many jobs well. In the coal preparation plant of the Amherst Coal Company this Link-Belt air-pulsated washer cleans coal from three different seams and also the product of another mine. Installed to clean 250 TPH. of 5" x 1/4", it is now handling about 300 TPH. of this size plus considerable portion of the 1/4" x 0".

Higher efficiency, lower cost and better quality of end products are among the benefits of modernization of coal handling and complete preparation including centrifugal and thermal drying at Amherst No. 1 mine at Amherstdale, West Virginia.

Coal is loaded from the Chilton, the Powellton and the Eagle seams. Foreign coal from the Amherst No. 3 mine is also brought to this plant by rail for preparation.

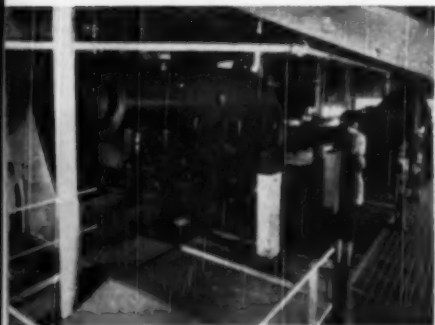
Link-Belt made major changes to the plant, furnishing complete new ROM screens with shaking picking table, vibrators for making separation at 1/4", mixing conveyor equipment, air-pulsated washer and auxiliary equipment. Also mine car handling equipment and belt conveyor.

Modernization of coal preparation and handling is making great strides forward in America. Our engineers will be glad to discuss your problems with you.



This shaking picking table is also a valuable addition to this plant. It replaces an apron type picking table and eliminates frequent delays due to the inability of many pickers to do the job. Picking is now done efficiently by two men, as shown above.

11,252



LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Johannesburg.



LINK-BELT

**COAL PREPARATION
and HANDLING EQUIPMENT**